


C39.202 : P83/10

Port Economic Impact Kit



U. S. DEPARTMENT
OF COMMERCE
Maritime Administration





Digitized by the Internet Archive
in 2012 with funding from
LYRASIS Members and Sloan Foundation

<http://archive.org/details/porteconomicimpa00arth>

PORT ECONOMIC IMPACT KIT

Prepared by
Arthur D. Little, Inc.
Pacific Coast Association of
Port Authorities

U.S. Department of Commerce
Maritime Administration
Office of Commercial Development
Office of Port and Intermodal Development

September 1979



FOREWORD

Port activities serve as vital catalysts to the generation of employment, taxes, revenues and business for local communities. Virtually every major metropolitan region of the United States centers around a port, or is closely linked by rail or highway with a port. As waterborne trade in the United States approaches 2 billion tons of cargo per year, the rippling economic effects of vibrant port activities will continue to provide jobs, dollars and local community development. It is, thus, important to understand and appreciate these economic impacts of local port development.

The Port Economic Impact Kit was developed to facilitate the preparation of economic impact reports by local communities or port authorities. This step-by-step manual is designed to standardize a methodology that will enhance the credibility, clarity and comparability of port economic impact studies. Employment of this Kit should involve existing staff and reduce the preparation costs of economic impact reports. Additionally, use of the Kit should allow periodic updates of impact estimates at minimal expense.

This report was prepared under the sponsorship of the Maritime Administration, the Canadian Ministry of Transport and the Pacific Coast Association of Port Authorities. The consulting firm of Arthur D. Little, Inc. prepared the Kit and worked closely with members ports of PCAPA in adapting and testing the impact methodology. This comprehensive end product is applicable for the analysis of maritime-related activities at all United States and Canadian ports.

Office of Port and Intermodal Development
Maritime Administration
U.S. Department of Commerce

September 1979

TABLE OF CONTENTS

	<u>Page</u>
I. OVERVIEW	
A. Background	1
B. Uses and Scope of the Kit	2
C. Organization of the Kit	3
II. PORT ECONOMIC IMPACT ISSUES	
A. Overview of Economic Impact Theory	8
B. Methodologies for Estimating Direct Impacts	9
C. Methodologies for Estimating Secondary Impacts	10
D. Relationship Between Ports and Port-Dependent Activities	14
E. Geographic Area of Analysis	15
III. DETAILED METHODOLOGY	
A. Initial Considerations	17
B. Design Survey	27
C. Survey Distribution	48
D. Survey Result Compilation	54
E. Development of Secondary Impact Multipliers	66
F. Calculation of Secondary Impacts	96
G. Preparation and Dissemination of Report	111
IV. GLOSSARY	116
APPENDIX	
A. Background	118
B. General Problems and Solutions	119
C. Specific Case Studies	122

LIST OF FIGURES, EXHIBITS, AND TABLES

<u>Figures</u>		<u>Page</u>
1	Economic Impact Study Elements	4
2	Program Schedule	6
3	Staff Responsibility	7

<u>Exhibits</u>		
A:2-1	Guidelines for Cost of Economic Impact Study	19
A:3-1	Estimated Staff Time Requirements to Complete Analysis	21
A:3-2	Calendar Time Schedule	23
B:1-1	Suggested Survey Questions	28
B:2-1	Possible Optional Questions	30
B:3-1	Sample Survey - Port Industry	33
B:3-2	Sample Survey - Port-Dependent Industry	34
B:4-1	Coding Instructions - Port Industry Survey	36
B:4-2	Coding Instructions - Port-Dependent Industry Survey	37
B:5-1	Sample Survey Cover Letter	40
C:2-1	Sample Survey Response Chart	51
E:3-1	Concentration Technique Calculation	73
E:4-1	Minimum Requirements Technique Calculation	76
E:7-1	Example of BEA County Income Data	83
E:7-2	Calculation of Income Multiplier	84
E:8-1	RIMS Industry Classifications	87
E:8-2	Waterborne Commerce Related Industries with RIMS Codes	95
F:4-1	Payroll/Sales Ratios for Major Industry Divisions	103
F:5-1	State Agencies and Universities Receiving BEA Local Income Estimates	106
	List of Data Requirement Publications	114

<u>Tables</u>		
1	Port of Grays Harbor Direct Activity	124
2	Port of Grays Harbor Total Economic Activity	125
3	Ports of San Francisco and Oakland Direct Activity	128
4	Ports of San Francisco and Oakland Total Economic Activity	129
5	Port of Vancouver, British Columbia Direct Activity	132
6	Port of Vancouver, British Columbia Total Economic Activity	133

I. OVERVIEW

This "economic impact kit" was prepared for the Pacific Coast Association of Port Authorities (PCAPA), the U.S. Maritime Administration (MARAD), and the Canadian Ministry of Transport. The purpose of this assignment was to develop an effective methodology which member ports could use to conduct their own economic impact assessments. Therefore, the resulting "kit" would have to be designed so that it did not require extensive technical skills and background or substantial financial and time commitments. At the same time, the methodology would have to produce reasonably accurate impact estimates when applied to port districts of different sizes with different cargo mixes. The end product of the assessment methodology would be an economic impact report which is both credible and able to be understood by the general public.

A. BACKGROUND

The first step in the assignment was a review of port economic impact studies and other information to develop a common set of definitions of port-related terms and an inventory of economic impact methodologies available. The glossary was prepared to insure proper understanding of the terms used in the kit and comparability among ports. (Existing studies show that the port industry may be defined to include only as little as the actual waterborne transport of goods or as much as all activity which occurs on port district property.) Common definitions tend to increase the credibility of individual impact studies by providing a body of studies for comparison.

The inventory of direct and secondary impact methodologies included both those used in port economic studies and those which are commonly available but have not been used for ports to date. These techniques were characterized by, among other things, the skills needed to implement them, time and financial outlays required, data requirements, and their applicability to PCAPA member ports. This inventory was reviewed by the PCAPA Economics Committee and the techniques to be developed for the kit were selected. It was decided that direct port industry impacts would be identified by means of a survey and that secondary (indirect and induced) economic impacts would be estimated by two techniques -- an economic base multiplier and an input/output model derived multiplier.

The methodologies selected for use by PCAPA members are presented in a series of 40 detailed steps describing data requirements and procedures. (Special sections to adapt the methodology for Canadian ports are also included.) The draft "economic impact kit" was reviewed by the Economics Committee for clarity and completeness. Finally, the methodology described in this kit was tested on four West Coast ports -- Grays Harbor, Washington; San Francisco and Oakland, California; and Vancouver, British Columbia.

B. USES AND SCOPE OF THE KIT

The procedures in the PCAPA economic impact kit will yield estimates of the current economic impact (employment, payroll, etc.) of the port on its community. These estimates can be derived from readily available data by existing port staff who may not have extensive skills or training in economics or mathematics. In particular, the methodology has been designed to eliminate, to the extent possible, the need for in-depth knowledge of and access to economic and statistical data sources and "expert" judgment about economic issues. While this has required some simplification of methods and procedures, we believe the methodology outlined in this kit will yield results sufficiently accurate for the majority of port district uses.

The principal use of this type of port economic impact study is to enhance community relations and improve public education efforts. At a time when taxpayers are becoming increasingly chary of all publicly funded enterprises, the benefits of showing a return on public investment -- not only revenues, but also jobs and income -- are obvious. The same approach can be used to project the community economic benefits of port expansion or other increase in port activity, although a major redirection of port operations or change in cargoes handled may require a more detailed economic assessment. Finally, the economic impact methodology will help policy makers identify the role of the port and its related activities in the overall local or regional economy as an input to broad planning decisions.

The economic impact methodology contained in this kit will most probably meet the needs of small and medium-sized ports which serve relatively simple economies and have limited financial resources for such efforts. Larger port districts with more complex economic inter-relationships may prefer to use the method as an annual reporting tool and spend additional funds on a more detailed in-depth economic study based on additional area-specific data and employing additional area-specific assessment techniques (e.g., a local or regional input/output model). These districts can use the kit to update some of the results of the detailed study periodically at relatively low cost by using their own staff and published data. Thus, this economic impact kit should prove useful to all PCAPA member ports.

While this kit is designed to yield reasonably accurate results with the use of available resources, it is important to recognize the limitations of the methodology. Perhaps most important, because a survey is required to measure direct activity, the estimate of total port industry impacts will be only as good as the survey. In other words, the credibility of the overall assessment will be enhanced if the time and effort necessary to increase the reliability of the survey are committed (e.g., by conducting a pretest of the questionnaire). Similarly, every effort must be made to compile a complete list of port industry firms from which the sample will be drawn. The development of reliable survey data is the single most important element of the economic impact study.

Because the kit is designed to be applicable to many different ports, it may not answer all the questions of interest to a particular port district. The kit's results are expressed in terms of income and output with additional steps available to estimate employment and some tax revenues. The secondary economic effects of port-dependent industries are not estimated because it is difficult to assess the true dependence of these firms on the specific port. Most tax impacts (sales, property, etc.) are not carried beyond the direct level because of double counting and other problems. This conservative bias (i.e., possibly underestimating the actual total impact of the port) usually tends to increase the credibility of an economic impact assessment. If a port needs information not provided by the basic methodology, it may be possible to add optional questions to the survey or develop additional ratio multipliers (see Step F:6 in Chapter III).

One specific ratio frequently used in port impact studies is the cargo multiplier, which is an estimate of the employment, income, revenue, tax paid, and similar economic measures associated with each ton of cargo shipped through the port. While the simplicity of this approach is attractive, closer examination of the relationships involved suggests that cargo multipliers may be quite misleading. For example, some elements of port industry employment may be directly related to tonnage (e.g., loading and unloading operations), but other elements are more closely tied to the number of ships moving through the port (e.g., pilotage and tugboats). Other elements of total employment tend to remain fixed no matter how much cargo moves through the port (e.g., port management and administration, freight forwarders, etc.). Other measures would be affected by the value of cargo (almost impossible to determine for containers), cargo origins and destinations (e.g., transportation savings), and other factors for which data are not readily available. Because we believe that the methodology described in this kit will yield more accurate and thus more useful impact estimates, a procedure for calculating cargo multipliers has not been developed.

C. ORGANIZATION OF THE KIT

The PCAPA economic impact kit is made up of three principal sections in addition to this overview. Chapter II presents a general discussion of economic interrelationships and economic assessment methodologies which explains some of the theory on which the kit is based. It may also serve as a technical appendix to a port's economic impact report. It is not necessary for a user to be familiar with this material before beginning the steps described in Chapter III. Chapter III is the detailed methodology "workbook" which describes the procedures, data sources, calculations, and other information necessary to conduct the port economic impact study. Chapter IV is a short glossary of economic and port industry terms used in the kit.

The methodology is organized into seven major elements, each of which contains several specific steps (see Figure 1). Each element is designed to accomplish one of the major tasks of the study which are:

FIGURE 1
ECONOMIC IMPACT STUDY ELEMENTS

- A. Initial Considerations
 - 1. Determine Public Purpose of Analysis
 - 2. Obtain Funding to Conduct Analysis
 - 3. Allocate Staff Time to Analysis
 - 4. Determine Scope of Study
 - 5. Select Geographical Area for Analysis
 - 6. Prepare Schedule for Project

- B. Survey Design
 - 1. Adopt Required Questions for Surveys
 - 2. Develop Optional Questions for Surveys
 - 3. Adjust Questionnaires for More Than One Port in Region
 - 4. Prepare Coding Instructions for Questionnaires
 - 5. Prepare Cover Letter for Questionnaires
 - 6. Identify Firms in the Port Industry
 - 7. Select Firms for Pretest of Survey Instrument
 - 8. Select Interview Format
 - 9. Conduct Survey Pretest and Revise Questionnaire

- C. Survey Distribution
 - 1. Advertise Study Prior to Survey Distribution
 - 2. Prepare List for Respondent Checkoff
 - 3. Conduct Survey

- D. Survey Result
 - 1. Code Returned Surveys
 - 2. Check Consistency of Survey Responses
 - 3. Estimate Value of Missing Responses
 - 4. Collect Port Employment and Income Data
 - 5. Tabulate Survey Responses by Industry and Impact Category
 - 6. Aggregate Survey Responses and Estimate Total Direct Impact

- E. Development of Secondary Impact Multipliers
 - 1. Select Methods for Secondary Impact Analysis
 - 2. Collect Income and Employment Data for Economic Base Multipliers
 - 3. Develop Employment Multipliers Using "Concentration" Approach
 - 4. Develop Employment Multipliers Using "Minimum Requirements" Technique
 - 5. Develop Employment Multipliers Using "Experience" Technique
 - 6. Develop "Consensus" Employment Multipliers
 - 7. Develop Economic Base Income Multipliers
 - 8. Select Industries for Analysis and Order RIMS Multipliers

- F. Calculation of Secondary Impacts
 - 1. Determine Share of Port Industry Income That is Basic
 - 2. Estimate Total Income Supported by Port Activities Using Economic Base Multipliers
 - 3. Estimate Total Sales Supported by Port Activities Using RIMS Multipliers
 - 4. Compare RIMS and Economic Base Techniques
 - 5. Update RIMS Estimates

- G. Preparation and Dissemination of Report
 - 1. Prepare Report
 - 2. Disseminate Report

- Initial Considerations
- Survey Design
- Survey Distribution
- Survey Result Compilation
- Development of Secondary Impact Multipliers
- Calculation of Secondary Impacts
- Preparation and Dissemination of Report

Each step is described in terms of its data requirements (including specific source citations), recommended action (the specific calculations or other work required), and output. Many steps also contain a discussion describing possible alternatives or problems, additional background information, constraints on the use of results, or other relevant issues. Each step represents a discrete work item so that the user can complete the program one step at a time.

Figure 2 shows the estimated project schedule. It is estimated that a maximum of about eight months will be needed to complete the economic impact study program. The first two months are allocated to determining the scope of the study and other initial considerations; the actual data collection and calculation work is expected to require about six months. Actual implementation time may vary depending on staff availability, the size of the port district, etc. (A small district may be able to complete personal or telephone surveys in less time than a larger district would need for mail surveys, for example.)

Three levels of port staff are required to implement the economic impact study -- management, a project director, and technical staff. The port district's management -- possibly the executive director or a committee of the governing board -- should make the initial decisions about the study's scope, funding, etc., and have review responsibility for all materials distributed to the public in the name of the port (questionnaires and cover letters, press releases, and the final report). The project director will have principal responsibility for the conduct of the study including supervision of technical staff and writing the impact report. Ideally, this individual would have some knowledge of economics and be well acquainted with the operation of the port. At a minimum, the project director should have read and understood all of the steps of this kit before work is begun. Technical staff would be responsible for data collection, calculations and tabulations, and, if necessary, conducting telephone and personal interviews. For ports with limited staff availability, a single person may serve as project director and also perform the technical staff tasks. A port might also use economics or planning students from a local college as interns to perform the technical staff functions. Figure 3 shows the level of staff responsibility associated with each step.

Before beginning this economic impact study, it is recommended that all of the steps be read. The characteristics and requirements of each individual port district will determine the way in which the study should be approached, including level of detail, approximate cost, and which steps may be considered optional.

FIGURE 2
PROGRAM SCHEDULE

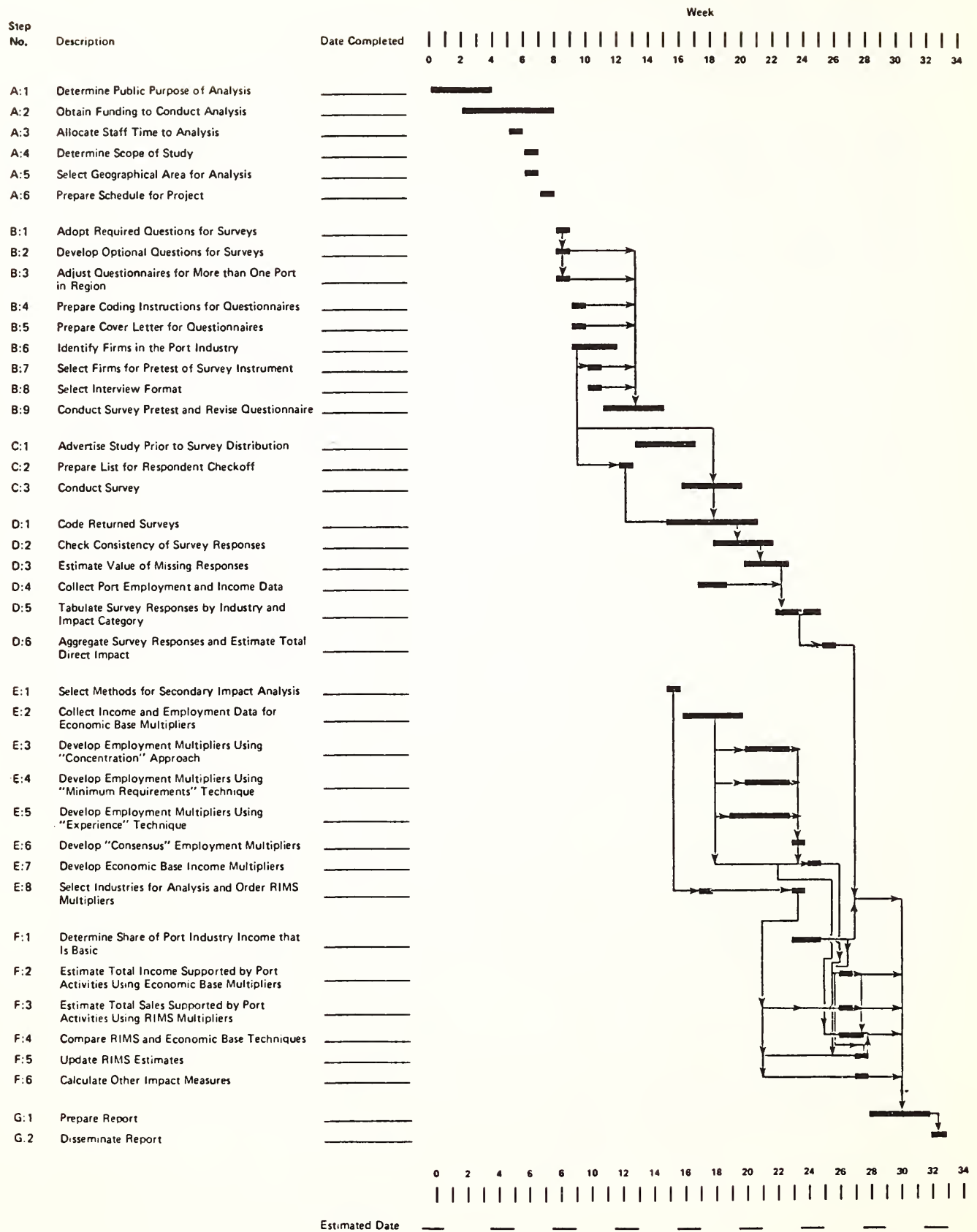


FIGURE 3

STAFF RESPONSIBILITY

Step No.	Description	Management	Project Direction	Technical Staff
A:1	Determine Public Purpose of Analysis	P		
A:2	Obtain Funding to Conduct Analysis	R	P	
A:3	Allocate Staff Time to Analysis	R	P	
A:4	Determine Scope of Study	P		
A:5	Select Geographical Area for Analysis	R	P	
A:6	Prepare Schedule for Project	R	P	
B:1	Adopt Required Questions for Surveys		P	
B:2	Develop Optional Questions for Surveys	R	P	
B:3	Adjust Questionnaires for More Than One Port in Region		P	
B:4	Prepare Coding Instructions for Questionnaires		P	
B:5	Prepare Cover Letter for Questionnaires	R	P	
B:6	Identify Firms in the Port Industry		R	P
B:7	Select Firms for Pretest of Survey Instrument		P	
B:8	Select Interview Format		P	
B:9	Conduct Survey Pretest and Revise Questionnaire		R	P
C:1	Advertise Study Prior to Survey Distribution		P	
C:2	Prepare List for Respondent Checkoff	R	P	
C:3	Conduct Survey		R	P
D:1	Code Returned Surveys		R	P
D:2	Check Consistency of Survey Responses		P	
D:3	Estimate Value of Missing Responses		R	P
D:4	Collect Port Employment and Income Data		P	
D:5	Tabulate Survey Responses by Industry and Impact Category		P	
D:6	Aggregate Survey Responses and Estimate Total Direct Impact		R	
E:1	Select Methods for Secondary Impact Analysis		P	
E:2	Collect Income and Employment Data for Economic Base Multipliers			P
E:3	Develop Employment Multipliers Using "Concentration" Approach		R	P
E:4	Develop Employment Multipliers Using "Minimum Requirements" Technique		R	P
E:5	Develop Employment Multipliers Using "Experience" Technique		P	
E:6	Develop "Consensus" Employment Multipliers		R	P
E:7	Develop Economic Base Income Multipliers		R	
E:8	Select Industries for Analysis and Order RIMS Multipliers		P	
F:1	Determine Share of Port Industry Income That is Basic		P	
F:2	Estimate Total Income Supported by Port Activities Using Economic Base Multipliers		R	P
F:3	Estimate Total Sales Supported by Port Activities Using RIMS Multipliers		R	P
F:4	Compare RIMS and Economic Base Techniques		R	P
F:5	Update RIMS Estimates		R	P
G:1	Prepare Report	R	P	
G:2	Disseminate Report	R	P	

P = performance

R = review

II. PORT ECONOMIC IMPACT ISSUES

A. OVERVIEW OF ECONOMIC IMPACT THEORY

The purpose of this kit is to estimate the economic impact of ports on the surrounding community -- that is, what the port contributes to the community in terms of income, jobs, taxes, and other economic measures. A complete accounting of these impacts must include not only the direct impacts of the port industry (and port activities), but also the indirect and induced effects created by the port industry. As discussed below, various methods have been developed for using observed economic relationships to determine the secondary activity associated with a given type and amount of direct activity.

Economic impacts, and economic activity in general, are determined by demand for goods and services. The direct impact of the port industry as defined in this kit is thus the output, employment, payrolls, and other economic activity created by the demand for the movement of water-borne commerce. As demand rises -- as producers and users ship more cargo through the port -- direct economic activity also increases. The demand for port industry services is translated into sales of several direct sector industries which provide stevedoring, pilotage, bunker fuel, marine insurance, and other goods and services.

To provide these services, the direct sector enterprises must obtain necessary inputs from several sources. For many, the largest purchase is the time of their employees; these purchases are reflected in both payrolls and employment. In addition, they must purchase commodities and services from other firms. Port industry purchases include such things as tugboats, cranes, office equipment, cleaning supplies, telephone service, and many, many others. These purchases are the indirect impacts of the port industry; if demand for port services stopped, demand for these services would also cease.

Indirect demand does not stop at this initial round. As an example, the supplier (manufacturer) of the cranes must purchase steel, machine tools, power, office supplies, and a variety of other equipment and services in addition to making payroll payments. Similarly, the firms which supply the crane manufacturer must also obtain inputs. The result is a continuous interchange of goods and services among the sectors of the economy in order to meet the demand in the port industry.

Along with these interindustry sales and payrolls, each round of spending also generates profits and taxes. The port industry's direct and indirect activities contribute to sales, income, property, fuel, and other federal, state, and local tax revenues.

In addition to the direct and indirect impacts, the port industry also has induced impacts created by the expenditures of direct and indirect payrolls. Payrolls and proprietors' income are spent for consumer goods and services including food, clothing, transportation, housing, and entertainment. People are employed to provide these items and more indirect sector inputs must be purchased, resulting in still more rounds of profits, payrolls, and taxes. Tax revenues purchase government services which require supplies resulting in yet another round of impacts.

In theory, these rounds of impacts never end, but they do approach a maximum level. The ratio between the total volume of sales (or income or employment) generated and sales directly related to the port is the multiplier for the port industry. The size of the multiplier depends on the structure, size, and diversity of the port district's (or region's) economy.

It is not likely that the port district's economy can provide all of the required goods and services. For example, heavy cargo handling equipment is typically produced by a few large manufacturers which serve national markets. Similarly, many consumer products are manufactured for national rather than local markets at one central plant or a few regional plants. These and many other items must be imported from other regions. These imports represent regional leakages from the multiplier impacts associated with the demand for port services. For example, a port's work orders, bills of lading, and similar forms could probably be produced by a local printer, but cranes, forklifts, or other heavy equipment would probably be purchased from a manufacturer outside the port district. The printer in turn, might buy his paper and ink from suppliers outside the port region, so that each round of impacts would be accompanied by leakages. These leakages vary in magnitude depending on the ability of the local economy to meet the demand for goods and services. The more self-sufficient an economy, the smaller the leakage and consequently the greater the local multiplier effect. Traditionally larger, more diverse economies have higher local multipliers than smaller ones simply because they can provide a greater percentage of locally demanded goods and services.

The port-related economy is not easily recognized because it is intertwined with the remainder of the regional economy. Few firms affected at the indirect and induced levels are totally dependent on the port. Their sales would decline if the port closed, but would not drop to zero.

B. METHODOLOGIES FOR ESTIMATING DIRECT IMPACTS

Because the port industry as defined in this kit does not conform to Standard Industrial Classification (SIC) categories, but includes parts of many SICs, there is no secondary source from which direct impacts can be determined. (As an example, an assessment of the local impacts of the primary metals industry could use all activity listed in SIC 33 in County

Business Patterns or a similar source as the direct sector and proceed from there; no similar indirect approach is possible for the port industry.) In addition, as discussed further below, port-dependent activities must be addressed not only by identifying users of the port (shippers and receivers) but also by estimating the extent to which these users are truly dependent on the availability of the port.

For these reasons, and because any mistakes made in the assessment of direct activity will be multiplied in the estimate of total economic impacts, a direct survey of port industry and port-dependent firms is necessary to measure direct impacts. Survey techniques also have the advantages of being able to be tailored to provide specific types of information which may not be available from other sources. For instance, in addition to the basic information needed for the economic impact study, questions could be added concerning estimated employee residential distribution (inside or outside the county), business expansion plans, or the need or desire for additional types of port services. As discussed elsewhere, shorter questionnaires are more likely to be completed, but a few optional questions may be very useful to the individual port district.

C. METHODOLOGIES FOR ESTIMATING SECONDARY IMPACTS

The basic assumption of economic impact analysis is that observed relationships in a region's economy can be used to determine the effects of changes in the level of economic activity on the regional economy as a whole. Simply, if activity in one industry increases by a given amount, the region's total economy can be expected to change in some predictable manner. These relationships are given in the multipliers described above, although they may be expressed as simple multipliers or a complex, sectorally disaggregated matrix of multipliers.

There are three principal types of methods used as classification systems for the relationships in a region's economy and as techniques for estimating the indirect and induced effects of changes in direct activity. These are:

- Economic base multipliers
- Interregional trade multipliers, and
- Input/output models.

Each of these methods can be classified according to its overall theoretical validity, the accuracy of its estimates, the skills required to develop coefficients and apply the methodology, and the cost, time, and amount of data required to implement the methodology. As might be expected, there is generally a tradeoff between the desire for a simple, low-cost approach and a more complex, complete, and accurate description of a region's economic system and interactions. Moreover, these considerations affect not only the choice among methods, but also the way

in which each method is applied. Each individual technique can be implemented with different levels of disaggregation, and the greater the disaggregation, the greater the usefulness, accuracy, cost, and data requirements. Therefore, the methodologies developed for this port economic impact kit and described in detail in Chapter III represent a reasonable compromise based on the expected level of resources available to the majority of users.

It is important to remember that each of these systems represents a "snapshot" of a region's economy and interrelationships at a single point in time (the period for which the data were collected). The direct application of multipliers and models to predict the overall effects of changes in port activity implicitly assumes that the relationships contained in the "snapshot" will not change over time because of structural changes in the region's economy (e.g., introduction of new industries), technological changes in products and processes, economies of scale, price effects, interfactor substitutions, or other forces, any of which could, of course, substantially alter economic interrelationships. The analyst who applies the techniques described in this kit must be aware of any changes which have occurred since the data were collected and any which might occur during the period for which forecasts are being made. For example, aggregate relationships between the port industry and the region's economy are likely to be affected by increasing use of container and ro/ro shipments, changes in the mix of shippers, or large increases or decreases in the amount of cargo handled. Since these changes cannot be explicitly incorporated into the estimating procedures described in this kit, it is important to understand the limitations of each of the impact methodologies.

1. Economic Base Multipliers

Economic base theory assumes that all economic activity in a region can be divided into two sectors, the export or basic sector which produces goods and services shipped out of the region and the local or non-basic sector which produces goods and services consumed within the region. The size of the non-basic sector is assumed to be a known function of the size of the basic sector. Export markets are considered the prime mover of the local economy. If employment serving this market rises or falls, employment serving the local market is presumed to move in the same direction. The theory further assumes that a region's economy changes slowly and that, as a result, the ratio of basic to non-basic employment, income, or other indicator is relatively stable over long periods.

The principal advantage of the economic base technique is its conceptual and operational simplicity. Economic base multipliers can be developed and applied by persons who do not have extensive backgrounds in economics or mathematics. Furthermore, these multipliers can be derived from a relatively small amount of readily available data, using standard procedures to determine "basic" employment in each sector.

In many cases it is the very simplicity of this technique which has led to its abuse -- most frequently by assuming that employment in certain sectors (typically agriculture, mining, and manufacturing) is basic and the remainder non-basic and using these totals to develop an employment multiplier. In fact, each sector of the economy serves both export and local markets, and these shares must be determined and summed to develop a multiplier. (It should also be added that income is preferable to employment as a measure of economic base relationships, and that ratio analysis can be used to derive employment from income.) In addition, economic base multipliers developed for regions in countries that have a large share of foreign exports will tend to be too high. This can be remedied by a relatively simple procedure, however, as described in the Chapter III discussion on use of the economic base technique for Canadian ports (see Step E:3, page 70).

Economic base multipliers are generally best limited to use as descriptors of present conditions rather than as a basis for projections. The introduction of a large new basic economic activity into the region could have significantly different non-basic effects than the existing aggregate basic sector, so that the previous multiplier would no longer be appropriate. Also, the economic base approach is most appropriate for small regions. As a region's economy becomes more diverse and complex, it contains a larger number of interindustry relationships tied to local demand which may not be affected by export demand.

As discussed in greater detail in Chapter III, the special nature of the port industry leads to certain difficulties in the use of the economic base approach. Most industries whose impacts are analyzed by this methodology are considered wholly basic activities. However, the port industry includes some income and employment which could be classified as basic (export-related) and some which could be termed non-basic (import-related). Therefore, it is necessary to estimate the basic component of port activity before the economic base multiplier can be used. Nonetheless, because of the attractiveness of this technique for small ports with limited resources, this technique is suggested in the kit.

2. Interregional Trade Multipliers

Interregional trade multipliers are developed from Keynesian income determination theory, which is based on an identity relationship among total income and the various components that constitute it -- i.e., consumption, investment, government spending, imports, and exports. The technique has structural similarities to input/output methodology, and the results produced are similar to those of economic base techniques. Unlike economic base methods, interregional trade multipliers make specific assumptions about the utilization of income for various purposes and from these estimates determine the effect of a change in exports. Like economic base multipliers, however, interregional trade multipliers do not provide any sectoral disaggregation, and so provide little insight as to the interrelationships of different sectors.

Because of the formulation of the underlying model, the interregional trade multiplier approach is capable of providing more accurate forecasts of economic activity than the economic base method, but requires far more information to do so. As a result, it costs far more

to implement than the economic base approach and requires a greater sophistication on the part of the analyst. Properly used, the two methods will provide similar estimates of point-in-time impacts, the type which are to be prepared with this kit. Therefore, a detailed method for using interregional trade multipliers has not been developed.

3. Input/Output Models

The basic premise of the input/output model framework is that each industry sells its output to other industries and final consumers (personal consumption, business investment, government spending, and exports) and, in turn, purchases goods and services from other industries and primary factors of production (such as capital and labor). Therefore, the performance of each industry can be determined by changes in both final demand and the specific interindustry relationships. Similarly, the economic impacts of each industry can be expressed in terms of increased demand for industrial production and the primary factors of production.

The I/O approach is the most appealing from a theoretical point of view since it allows the sectoral disaggregation of impacts and is thus most sensitive to the multi-industry nature of port activities. The I/O framework enables the analyst to avoid the problems associated with separating port activities into export and local since, as done in the MARAD study of the U.S. port industry, the port industry can be treated as a single industry in the I/O matrix. Input/output models are generally considered the most theoretically accurate of the several tools available for describing economic interrelationships in a regional or national economy.

As might be expected, just as the disadvantages of the economic base multiplier are associated with its simplicity, the disadvantages of the I/O approach are due to its complexity. The amount of data needed to construct an I/O table and the associated time, cost, and technical skill requirements are enormous. Available state or regional I/O tables cannot be used for the area of interest to a port district (usually a single county) because of the likely structural differences in the two areas' economic relationships. Even when an I/O table for a suitable geographic area does exist, it must be used carefully because the data needs of I/O tables generally cause them to be prepared relatively infrequently, and existing tables are often several years out of date. The smaller the region, the more likely this time-related error is to cause significant problems (e.g., a county's interindustry flows could be substantially affected by the opening or closing of one or two large plants). Finally, with the exception of the recent MARAD study, I/O models do not typically treat the "port industry" as defined in this kit as a single component of the interindustry matrix.

One possible method for using the I/O approach to estimate the economic impacts of small ports involves the use of the RIMS (Regional Industrial Multiplier System) data developed from the national I/O model by the Bureau of Economic Analysis. The RIMS procedure currently uses the 1967 national I/O table in conjunction with industrial output information for counties throughout the nation to derive industry-specific multipliers for regions ranging in size from counties to multi-state

areas. Multipliers based on the 1972 national I/O table are expected to be available by mid-1979. Since the technology in the port industry and economic interrelationships in many counties and regions have changed rapidly since the 1967 and 1972 I/O tables were developed, it may not be appropriate to use the RIMS approach by itself. Nevertheless, it may still serve as a useful check on an economic base multiplier as recommended in this kit.

D. RELATIONSHIP BETWEEN PORTS AND PORT-DEPENDENT ACTIVITIES

Since the purpose of this kit is to assess the full impact of port activities, including port-dependent activities, it is important to examine the nature of the relationship between ports and port-dependent activities. Our review of port economic impact assessments has shown that researchers frequently allocate the total impacts of port-dependent or related activities to the port without any attempt to assess the importance of port availability to these industries. In point of fact, many industries which are generally considered port-dependent from a location decision point of view (coal, grain, iron and steel, lumber and pulp) typically occur at substantial distances from actual port facilities (where resources are available) and are port-dependent in that cost-effective access to a suitable port is required.

This is most clearly the case when mini-bridge cargos are considered. Here the particular port is probably only selected for convenience and its absence would have little, if any, effect on the operations of shippers and receivers whose primary concerns are the most cost-efficient methods of transportation. In these cases, alternative ports would serve as well.

While there are undoubtedly some port-dependent activities tied to and unable to survive without a specific port, it is necessary to attempt to assess the importance of a port to its users so that the amount of dependent activity can be appropriately allocated. Even a firm which customarily ships all of its output through the local port might consider only 10% of its sales actually dependent on the particular port; the remaining 90% of its business could be handled through other ports or via alternative modes of transportation.

In addition to gauging how dependent the port-dependent industries are, it is also important to look critically at activities which take place on port property. Even though some studies have treated all activities on port property as part of the port industry, it is clear that some of them may not be port-related at all except by accident of location. As an example, several of the old finger piers in San Francisco are used for parking or storage of recreational vehicles, simple economic uses of otherwise vacant space rather than port-related activities. The economic development role of Washington public port districts leads to the location on port property of industries which may be completely, partially, or not at all dependent on port availability. Therefore, we believe it is critical that ports attempt to assess accurately the true dependence of "port-dependent" activities on the local port and reflect these findings in their analyses.

E. GEOGRAPHIC AREA OF ANALYSIS

In the past, studies of port economic impacts frequently included the concept of the port "hinterland" -- a natural market area for cargoes moving through the port. The prevalence of the hinterland concept has declined in recent years, largely as a result of mini-bridge and land-bridge practices in which ports are used as transshipment points rather than primary origins and destinations. Any "hinterland" defined to include the majority of port users would probably be so large that impacts measured for this study area would be meaningless to port district residents and decision makers.

Because of the expected uses of this kit, we believe it is appropriate that impacts be developed for relatively small geographic areas. While a small geographic unit will not encompass all of the economic activity generated by its port, this is the area of analysis most relevant to port district residents and decision-makers. Because of the need to prepare an analysis directed toward local concerns and because of the level of geographic disaggregation of available statistical data, we recommend that individual counties or small, economically related groups of counties (e.g., Standard Metropolitan Statistical Areas) be used as study areas for the purposes of this kit.

III. DETAILED METHODOLOGY

This section is the detailed guide for undertaking a port economic study. Each of the required and optional steps is described in terms of its purpose, data requirements, significant issues, action to be taken, and expected use of results.

In those steps which require different data sources or procedures for Canadian ports, appropriate alternatives are described. All other steps should be completed in the same manner for Canadian and U.S. ports.

INITIAL CONSIDERATIONS

Step A:1

PURPOSE:

Identify the public purpose of the analysis. All subsequent steps should be completed in a manner to achieve the purpose.

DATA REQUIREMENTS:

None.

RECOMMENDED ACTION:

There are three basic uses for documents developed using this kit: information dissemination, policy guidance for port planning and development, and assessment of the impacts of changes in port activities. The user should identify which of these is appropriate for the application, as the care and level of effort should reflect the purpose. The greatest accuracy would be necessary for those projects that will influence port policy.

USE OF RESULTS:

Decisions regarding use of the analysis should guide subsequent steps in terms of level of effort and thoroughness of analysis.

INITIAL CONSIDERATIONS

Step A:2

PURPOSE:

Acquire sufficient funding to complete the analysis.

DATA REQUIREMENTS:

Approximate number of firms on port property, the number of local firms who ship or receive goods through the port, purpose of the analysis (see Step A:1), wages of persons assigned to the analysis, and the cost of required input data. Knowledge of potential funding sources.

RECOMMENDED ACTION:

Funding source should be identified. Options normally include:

- Internal funding, and
- External grant.

Any requirements to obtain funding should be identified and met.

The cost of analysis fluctuates depending on the size of the port, the desired level of accuracy and comprehensiveness, wage rates of staff, etc. Guidelines for cost estimation are shown in Exhibit A:2-1.

After cost and funding source are identified, necessary funds should be committed to complete the analysis. If appropriate, a separate internal budget should be allocated to the project.

USE OF RESULTS:

Acquired funds are used to finance completion of the analysis.

Exhibit A:2-1

GUIDELINES FOR COST OF ECONOMIC IMPACT STUDY

<u>ITEM</u>	<u>COST</u>	
	<u>Materials</u>	<u>Staff</u>
1. Collect general data (assumes most data obtained from sources not requiring purchase)	\$ 100	\$1,600
2. Survey costs (survey printing, mailing, etc.)	\$ 10 per firm	\$4,500
3. Data for estimating indirect impacts		
Income multipliers	\$ 150	\$4,500
RIMS multipliers	\$ 1,100	\$3,000
4. Report Production (100 copies)	\$ 1,000- \$ 3,000	\$2,500

The numbers reflect expected costs for an average West Coast port that will contact 200-300 respondents. It is assumed that all analytical work is conducted in-house, that the work is done within the timeframe suggested in Step A:3, and that no significant problems are encountered in implementing the methodology. Staff time is estimated at a rate of \$2,000 per person month.

The total cost will depend on the methodology selected to estimate indirect and induced impacts and the degree of accuracy. To give an example of total costs the following estimates were prepared assuming 200 survey respondents, a \$2,000 report production cost, and use of different impact methodologies.

	<u>Materials</u>	<u>Staff</u>	<u>Total</u>
Income Multipliers	\$4,250	\$13,100	\$17,350
RIMS Multipliers	\$5,200	\$11,600	\$16,800

INITIAL CONSIDERATIONS

Step A:3

PURPOSE:

Allocate sufficient staff and calendar time to complete the analysis.

DATA REQUIREMENTS:

Approximate number of firms on port property, the number of local firms who ship or receive goods through the port, purpose of the analysis (see Step A:1), familiarity of persons assigned to the analysis with techniques and data to be used, and other commitments of this staff.

RECOMMENDED ACTION:

Have staff who will complete the project review the entire kit and assess their ability to implement it.

Estimates of staff time required to complete the analysis for ports of varying sizes are shown in Exhibit A:3-1. Adjust these estimates based on staff abilities.

Calendar time completion estimates are shown in Exhibit A:3-2. These should be adjusted based on level of staff commitment and ability.

Based on estimated staff and calendar time requirements make necessary adjustments in scheduling chart, Exhibit A:3-2.

USE OF RESULTS:

The scheduling chart enables the analyst to track completion of tasks and ensure the start and completion of tasks in the required sequence.

EXHIBIT A:3-1

ESTIMATED STAFF TIME REQUIREMENTS TO COMPLETE ANALYSIS

The basic variables which affect the amount of staff time required are the number of respondents to the survey, the desired accuracy of the results, and the methodology used to estimate the indirect and induced impacts.

Staff time requirements are separated into three staff levels: Senior port management, project director, and technical staff. The table below shows estimated time requirements for ports of different sizes using different impact methodologies.

Project Phase	Port staff time requirement estimates (person-days)				
	Number of Survey Respondents				
	50	51-100	101-200	201-350	351-500
A. Initial Considerations					
Senior Management	3	3	4	4	4
Project Director	4	4	6	6	7
Technical Staff	0	0	0	0	0
B. Survey design					
Senior Management	1	1	1	1	1
Project Director	10	12	15	18	20
Technical Staff	3	3	5	7	10
C. Survey Distribution					
Senior Management	1	1	1	1	1
Project Director	2	2	3	4	5
Technical Staff	2	3	3	5	7
D. Survey Result Compilation					
Senior Management	0	0	0	0	0
Project Director	3	6	9	12	15
Technical Staff	7	11	18	23	30

E. Development of Secondary
Impact Multipliers*

Senior Management	0	0	0	0	0
Project Director	10	10	10	10	10
Technical Staff	4	4	6	6	8

F. Calculate Secondary
Impacts*

Senior Management	0	0	0	0	0
Project Director	11	11	13	15	17
Technical Staff	4	5	9	10	15

G. Prepare and Disseminate
Report

Senior Management	2	2	2	2	2
Project Director	6	8	8	10	12
Technical Staff	1	1	1	2	2

Total Time

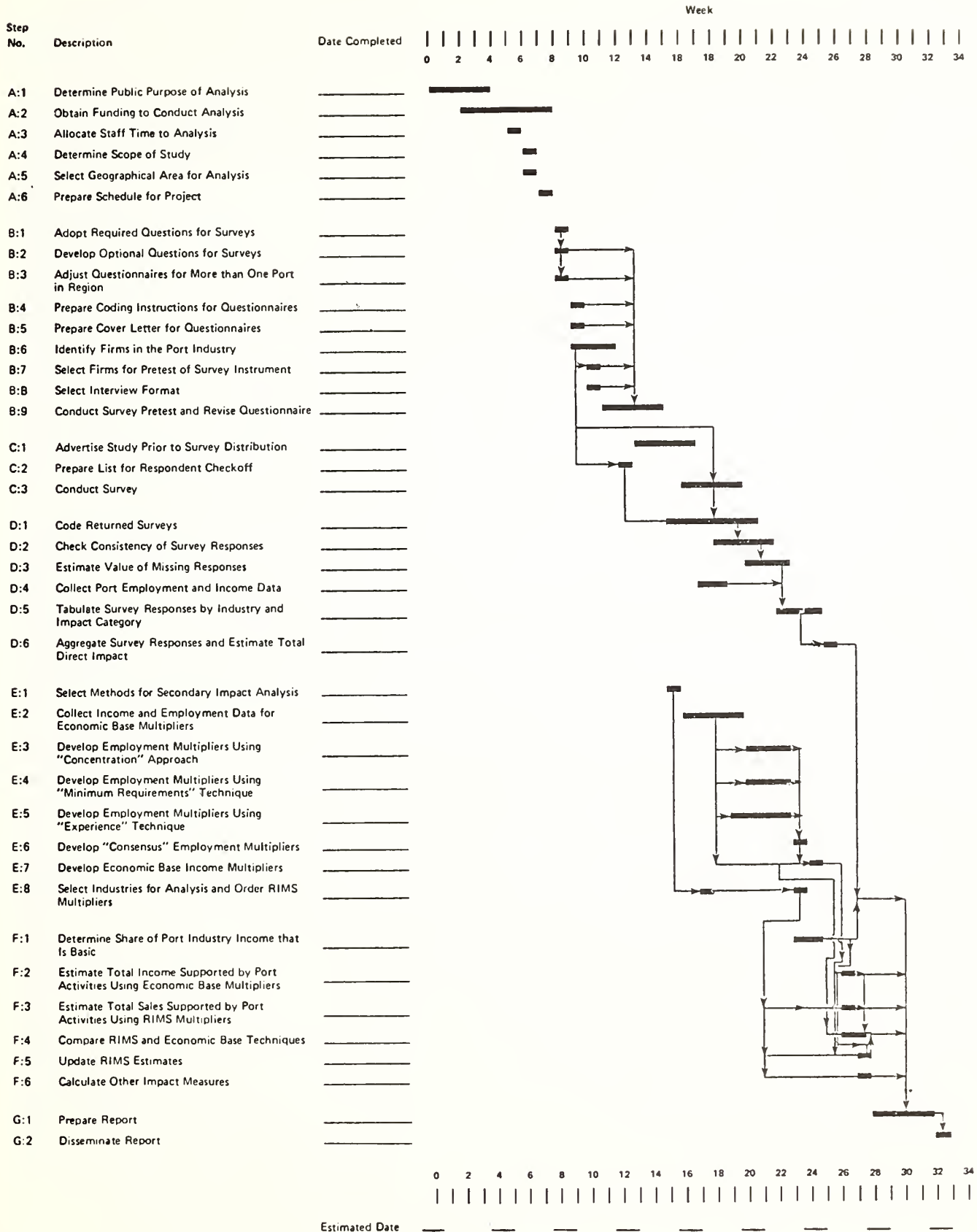
Senior Management	7	7	8	8	8
Project Director	46	53	64	75	86
Technical Staff	21	27	42	53	72

NOTE: Assumes all optional steps are performed.

* Assumes that both income multiplier and RIMS multiplier techniques are used.

EXHIBIT A:3-2

CALENDAR TIME SCHEDULE



INITIAL CONSIDERATIONS

Step A:4

PURPOSE:

Determine whether port industry activities, port-dependent industry activities, or a combination of both will be addressed in the analysis.

DATA REQUIREMENTS:

Results of Steps A:1-A:3.

DISCUSSION:

The majority of port industry firms are classified in SIC 44, Water Transportation, and SIC 47, Transportation Services. This includes tug and towing services, stevedores, marine terminal operators, pilots, vessel operators, freight forwarders, custom house brokers, shipping agents, export/import firms, and ports. Also included are trucking firms that interface with waterborne carriers. Port-dependent industry firms are those that utilize water transportation.

RECOMMENDED ACTION:

For applications where the purpose of the analysis incorporates a description of the activities to be included, the stated purpose should be followed. Otherwise, available time and budget should serve as guidelines. Port industry firms should always be included and treated separately from port-dependent firms. Not including port-dependent firms can often reduce budget and staff time requirements by as much as 60%.

USE OF RESULTS:

If it is decided to include port-dependent industries and firms then all sets of instructions for those activities must be completed. Otherwise, they can be deleted.

INITIAL CONSIDERATIONS

Step A:5

PURPOSE:

Select the geographical area within which port industry and port-dependent industry impacts will be measured.

DATA REQUIREMENTS:

Knowledge of location of port industry and port-dependent industry firms and of political boundaries.

RECOMMENDED ACTION:

Sometimes the desired geographical boundaries are defined in Step A:1; these should be followed as far as practical.

Because most of the secondary data inputs are defined along political boundaries, the use of such regional definitions is convenient and saves time and effort if adopted. For U.S. ports, a county or group of counties comprises the recommended region. For Canadian ports a census metropolitan area would define the region.

Some ports will wish to consider only their own area of jurisdiction or actual land ownership. Such a selection can be made and appropriate firms for contact can be identified. However, it is likely that secondary impacts will be incorrectly estimated if a port's boundaries are not the same as those mentioned above.

USE OF RESULTS:

In the final report, measured impacts should be described with reference to the impact area. Also, surveys should be sent only to those firms located in the selected impact area, regardless of whether there might still be port industry or port-dependent industry firms outside its boundaries.

INITIAL CONSIDERATIONS

Step A:6

PURPOSE:

Prepare a detailed schedule for all tasks that will serve as a guide during completion of the analysis.

DATA REQUIREMENTS:

Results of Step A:3 and suggested schedule chart shown in Exhibit A:3-2.

RECOMMENDED ACTION:

A flow chart such as the one shown in Exhibit A:3-2 can be useful for ensuring the proper sequencing of tasks. The tasks in Exhibit A:3-2 are structured so that the entire analysis can be completed within 7-8 months. It is unlikely that the analysis can be completed in less time if all steps are followed in the recommended sequence.

However, a longer time might be required. In such event, all tasks should be rescheduled. The greatest additional time is normally required for those tasks relating to distribution, receipt, and coding of surveys.

USE OF RESULTS:

The final scheduling chart provides an outline and checklist for the analyst. It should be used throughout the study to ensure on-time completion and proper sequencing of tasks.

Step B:1

PURPOSE:

Review and adopt suggested questions for port industry survey.

DATA REQUIREMENTS:

Suggested questions shown in Exhibit B:1-1.

RECOMMENDED ACTION:

At least the first five questions shown in Exhibit B:1-1 should be included in a survey of port industry firms. They should be reviewed, reworded if the pre-test shows that to be necessary, and coupled with optional questions selected in Step B:2. Sample survey forms are included as Exhibits B:3-1 and B:3-2. While questions 6-8 are not absolutely required they should all be included in order to facilitate the checking of responses for consistency and to provide a wider variety of impact measures.

USE OF RESULTS:

The suggested questions form the base of the survey instrument for firms in the port industry. The survey instrument is the primary means for obtaining information about these businesses.

PORT DEPENDENT INDUSTRY:

The suggested questions for the port dependent industry survey are the same as those for the port industry with the addition of those listed in the bottom of Exhibit B:1-1. The recommended action for the use of these questions is the same as that for the port industry.

SUGGESTED SURVEY QUESTIONS

PORT INDUSTRY

1. Description of waterborne commerce related activities (used in defining the firm by industry).
2. On what date does your fiscal year end? (signals differences in time periods for which data are assembled).
3. Annual sales or revenues (used in conjunction with input/output multipliers and for determination of sales impacts).
4. Average annual number of employees (used in determination of employment impacts and in expansion of survey results to the total universe of waterborne commerce related firms).
5. Annual payroll (used in determination of income impacts and in development of income multipliers).
6. Annual purchases of goods and services from local region (used to provide a direct measure of local impact).
7. Types of goods and services purchased locally (assists in determination of basic/non-basic distinction of firms and industries).
8. Taxes paid to local governments (used to develop tax impacts).

PORT-DEPENDENT INDUSTRY

In addition to the port industry questions listed above, the following questions are required:

1. Percentage of total product movements through local ports (assists in the allocation of impacts to the region and ports within the region).
2. Percentage of total supplies moving through local ports (assists in the allocation of impacts to the region and ports within the region).
3. What alternative transport facilities could be used (assists in the determination of the dependence of the region's industries upon the port).
4. What percentage of the firms's sales would be lost without the port's facilities (determines dependence upon port facilities in quantitative terms).

SURVEY DESIGN

Step B:2

PURPOSE:

Define and incorporate optional questions into the survey form to be sent to firms in the port industry.

DATA REQUIREMENTS:

List of optional questions shown in Exhibit B:2-1.

RECOMMENDED ACTION:

Optional questions are used both to develop more detail about the issues raised in the required questions and to develop information about topics of interest to the port but not directly required for an economic impact assessment.

Several possible optional questions are shown in Exhibit B:2-1. The analyst should incorporate these questions only if a specific use can be made of the answers. Some of the optional questions would not be meaningful for every firm -- e.g., the primary commodities shipped or received would have little meaning for a derrick barge firm.

The analyst can also develop additional questions which are of particular relevance to the port under analysis. These should be placed so as not to interrupt the flow of the required questions.

In general, we recommend that the shortest possible questionnaire form be used as it is more likely to draw a response.

USE OF RESULTS:

The optional questions combined with the required questions form the survey for firms in the port industry. The survey instrument is the primary resource for obtaining information about these firms.

PORT-DEPENDENT INDUSTRY:

Optional questions that could be used in the port-dependent industry survey questionnaires are also provided in Exhibit B:2-1. It should be remembered that longer and more involved questionnaires will lower the response rate. This is true of both the port industry questionnaires and port-dependent industry questionnaires, but the greater number of required questions for port-dependent industry questionnaires increases the problem.

EXHIBIT B:2-1

POSSIBLE OPTIONAL QUESTIONS

1. Please provide an estimate of your employment in terms of the following:

Executive/Professional	_____ %
Management	_____ %
Operations	_____ %

2. Please provide an estimate of the percentage of your employees living in:

_____ City	_____ %
_____ County	_____ %
_____ Region	_____ %

3. Three most common cargo origins:

Location	Percent
_____	_____ %
_____	_____ %
_____	_____ %

Three most common cargo destinations:

Location	Percent
_____	_____ %
_____	_____ %
_____	_____ %

4. Port facility(ies) utilized most frequently (i.e., pier, terminal, shed, crane, etc.):

5. Primary advantage of this particular port for movement of your goods (rank 3 elements):

Service Efficiency	_____
Convenience	_____
Cost	_____
Landside Transportation	_____
Market Proximity	_____
Other (please comment)	_____

EXHIBIT B:2-1
(Continued)

6. Have you any plans for a significant modification of port usage in terms of cargo volume, frequency of facility use, type of landside transportation, etc.?
7. In considering existing port operations, what area of service should be expanded or improved?

Waterside

Landside (e.g., storage, cargo handling, transportation services, etc.)

8. The primary commodities you ship or receive through ports in the _____ region are:

- a. Commodities shipped _____
- b. Commodities received _____

9. If port _____ facilities were not available, what percentage of your sales/revenues and jobs in the _____ region would be lost?

- a. Sales/Revenues _____ %
- b. Jobs _____ %

SURVEY DESIGN

Step B:3

PURPOSE:

Adjust the survey questions for cases where there is more than one port in a region.

DATA REQUIREMENTS:

Identification of all public and private ports in the region selected for the analysis in Step A:5.

RECOMMENDED ACTION:

If there is more than one port in a region and firms in the port industry work with more than one port in the region, it is necessary to have them allocate their impacts among ports.

If information about firms' activities for all ports is desired, the questionnaire should have separate reporting spaces for their activities with each port or at least an additional question that asks for the percentage of total business associated with each port. If information for only one port is desired, that should be so noted at the beginning of the survey in bold type.

A recommended survey form is shown in Exhibit B:3-1. An alternative format that would be useful in obtaining information from firms whose management is reticent about providing information would include multiple choice responses. For example, employment categories of 1-5, 6-15, 25-40, etc. could be provided on the survey form, the appropriate category to be circled by the respondent. Suitable multiple choice categories could be constructed for almost every question.

USE OF RESULTS:

The modified survey is used in all subsequent steps where appropriate.

PORT-DEPENDENT INDUSTRY:

Step B:3 is unchanged for the port-dependent industry, although a separate survey form is included as Exhibit B:3-2.

EXHIBIT B:3-1
PORT INDUSTRY QUESTIONNAIRE

ALL INFORMATION WILL BE HELD IN STRICT CONFIDENCE

Company Name _____

City _____ Telephone (____) _____

Respondent Name _____ Title _____

1. Briefly describe your waterborne commerce-related operations in the _____ region:

PLEASE ANSWER QUESTIONS 2 THROUGH 8 USING INFORMATION FROM YOUR LATEST FISCAL YEAR. PLEASE PROVIDE INFORMATION ONLY FOR THOSE ACTIVITIES WHICH OCCURRED IN THE _____ REGION.

2. On what date does your fiscal year end? _____

3. Annual sales or revenues from operations: \$ _____

4. Average annual number of full-time equivalent employees: _____ OR, if you have more detailed information, answer the following:

a. Average annual number of permanent full-time employees: _____

b. Average annual number of permanent part-time employees: _____

c. Average annual number of contract employees: _____

5. Annual payroll for permanent and contract employees (including benefits): \$ _____

6. Annual purchases of goods and services from regional businesses:

a. Goods: \$ _____

b. Services: \$ _____

c. If you lease, annual rental payment: \$ _____

7. Type of goods and services purchased from regional businesses: _____

8. Annual taxes and fees paid to local governments:

a. Property tax: \$ _____

b. User fees for public services (water, trash disposal, port fees, etc.): \$ _____

c. Sales tax: \$ _____

d. Other local government taxes and/or fees: \$ _____

9. What percentage of your operations are provided for or conducted in:

a. Port of San Francisco _____% Port of Oakland _____% Other _____%

Please DO NOT
Write in this Space

1. _____

2. _____

3. _____

4. _____

a. _____

b. _____

c. _____

5. _____

6.a. _____

b. _____

c. _____

7. _____

8.a. _____

b. _____

c. _____

d. _____

9.a. _____

b. _____

c. _____

PORT-DEPENDENT INDUSTRY QUESTIONNAIRE

ALL INFORMATION WILL BE HELD IN STRICT CONFIDENCE

Company Name _____

City _____ Telephone (____) _____

Respondent Name _____ Title _____

Please DO NOT
Write in this Space1. Briefly describe the business in which your firm is involved: _____

1. _____

PLEASE ANSWER QUESTIONS 2 THROUGH 13 USING INFORMATION FROM YOUR LATEST FISCAL YEAR. PLEASE
PROVIDE INFORMATION ONLY FOR THOSE ACTIVITIES WHICH OCCURRED IN THE _____ REGION.

2. On what date does your fiscal year end? _____

2. _____

3. Annual sales or revenues from operations: \$ _____

3. _____

4. Average annual number of full-time equivalent employees: _____ OR, if you have more
detailed information, answer the following:

4. _____

a. Average annual number of permanent full-time employees: _____

a. _____

b. Average annual number of permanent part-time employees: _____

b. _____

c. Average annual number of contract employees: _____

c. _____

5. Annual payroll for permanent and contract employees (including benefits): \$ _____

5. _____

6. Annual purchases of goods and services from regional businesses:

a. Goods: \$ _____

6.a. _____

b. Services: \$ _____

b. _____

c. If you lease, annual rental payment: \$ _____

c. _____

7. Types of goods and services purchased from regional businesses: _____
_____7. _____

8. Annual taxes and fees paid to local governments:

a. Property tax: \$ _____

8.a. _____

b. User fees for public services (water, trash disposal, port fees, etc.): \$ _____

b. _____

c. Sales tax: \$ _____

c. _____

d. Other local government taxes and/or fees: \$ _____

d. _____

9. The primary commodities you ship or receive through ports in the _____ region are:

9.a. _____

a. Commodities shipped _____

b. _____

b. Commodities received _____

c. _____

10. Approximately what percentage of your total product movements are shipped through the following ports
in the _____ region:

10.a. _____

a. _____ % b. _____ % c. _____ %

b. _____

c. _____

11. Approximately what percentage of your supplies move through the following ports in the _____
region:

11.a. _____

a. _____ % b. _____ % c. _____ %

b. _____

c. _____

12. If you were denied the use of these port facilities, which, if any, alternative ports (other than those listed
above) or means of transportation would you use to ship your products and/or receive your supplies:12. _____
_____13. If these port facilities were not available, what percentage of your sales/revenues and jobs in the
_____ region would be lost:

a. Sales/revenues: _____ %

13.a. _____

b. Jobs: _____ %

b. _____

SURVEY DESIGN

Step B:4

PURPOSE:

Prepare instructions for coding survey responses.

DATA REQUIREMENTS:

Completed survey form, Standard Industrial Classification Manual, and Exhibit B:4-1.

RECOMMENDED ACTION:

The responses to the survey must be summarized for use in the analysis. The coding instructions are a specific format for reporting survey responses.

In general, coding instructions are straightforward -- e.g., employment is coded as reported in person-years of employment, income is coded as dollars (rounded to the nearest thousand), etc.

If an SIC code was not provided by the respondent, the most difficult part of the coding is the allocation to an activity. Here the Standard Industrial Classification Manual and Exhibit B:4-1 are used.

The analyst should use the SIC manual to determine if the activity is part of the port industry and, if so, select the appropriate classification and if not, disregard the return.

Coding instructions for the other required questions are also listed in Exhibit B:4-1. The analyst should develop coding categories for any optional questions used.

USE OF RESULTS:

The coding methods are used when the questionnaires are returned and the results tabulated (see Step D:1).

PORT-DEPENDENT INDUSTRY:

Coding instructions for port-dependent industry surveys are presented in Exhibit B:4-2. Those questions that would have similar responses in port industry and port-dependent industry surveys can be coded using the instructions found in Exhibit B:4-1.

CODING INSTRUCTIONS - PORT INDUSTRY SURVEY

Responses should be coded in the box along the right hand edge of each survey form. The following numbering system corresponds to the numbering on the attached survey form (Exhibit B:3-1).

1. Interviewee industry - use four-digit Standard Industrial Classification Manual codes from the 1972 edition.
2. Fiscal year ending date - code month, day, and year in six places, e.g., 123178 being the code for December 31, 1978. Insert zeros if necessary -- e.g., 060178 being the code for June 1, 1978.
3. Sales or revenues - code amount in thousands of dollars or dollars, but be consistent. Coding in thousands of dollars reduces the key-punching requirements if the data are to be manipulated by computer.
4. Employment - code the number of employees as given.
5. Payroll - code amount as thousands of dollars or dollars, consistent with question 3.
6. Goods and services purchased; lease payments - code amounts on appropriate lines as thousands of dollars or dollars, consistent with question 3.
7. Types of goods and services purchased - use Standard Industrial Classification Manual to determine industry that provides the listed goods and services; codes should be as detailed as is practical from the information given (i.e., only one- or two-digit codes may be possible in some cases). Space is provided for four codes on the sample survey form.
8. Taxes and fees - code amount as thousands of dollars or dollars, consistent with question 3.

CODING INSTRUCTIONS - PORT-DEPENDENT INDUSTRY SURVEY

Responses should be coded in the box along the right hand edge of each survey form. The following numbering system corresponds to the numbering on the attached survey form (Exhibit B:3-2).

Questions 1-8 should be coded in the same manner as questions 1-8 of the port industry survey; see Exhibit B:4-1 for instructions.

9. Commodities shipped and/or received - A pre-existing coding system, such as the Corps of Engineers' Waterborne Commerce commodity classification or the Bureau of Census Schedule A and B codes, can be used or a less detailed port-specific coding system can be established.
10. Distribution of product movements among ports - percentages should be coded as given -- e.g., 15% coded as 15.
11. Distribution of supply movements among ports - percentages should be coded as given -- e.g., 15% coded as 15.
12. Alternate ports or transport modes - the simplest coding scheme would be:
 - 1 -- rail
 - 2 -- truck
 - 3 -- air
 - 4 -- barge
 - 5 -- other ports

This could be expanded by having separate codes for various other ports, various rail lines, various truck lines, etc.

13. Percentage of revenue lost without port - percentages should be coded as given -- e.g., 15% coded as 15.

Step B:5

PURPOSE:

Develop a cover letter to port industry firms that will explain the survey and generate a high response level.

DATA REQUIREMENTS:

None.

RECOMMENDED ACTION:

The survey should be accompanied by a one-page cover letter that:

- Explains the purpose of the study,
- Promises confidentiality of information,
- Stresses the importance of a prompt response and sets a cut-off date,
- Expresses thanks for cooperation and promises a copy of the study results,
- Provides a contact person at the port who can explain the meaning of the questions in greater detail and answer other inquiries about the study, and
- Is signed by the chief administrative officer of the port or the chairperson of the port commission.
- Provides the potential respondent with a return address, especially if the completed questionnaires are not to be sent to the port. To prevent the possibility of public disclosure, it may be wise to have the forms sent to a private individual or firm, such as the port's legal counsel.

Exhibit B:5-1 shows an example of a letter having these characteristics.

USE OF RESULTS:

The letter should be attached to and sent with all mail questionnaires. If either personal or telephone surveys are used, a brief opening statement conveying the same information should be incorporated.

PORT-DEPENDENT INDUSTRY:

Exhibit B:5-1 is suitable for the port-dependent industry firms as well as the port industry firms. The guidelines suggested under "RECOMMENDED ACTION" should be adhered to for both the port industry and port-dependent industry cover letters.

SAMPLE SURVEY COVER LETTER

Dear Mr. Jones:

The Port of Daly City is engaged in a study to determine the economic benefits of waterborne commerce activity on the San Francisco Bay region. The results of this study will benefit the Port of Daly City and consequently benefit firms and individuals doing business with the Port. The collection of basic economic data from local firms is the most critical component of this study. The questionnaire attached to this letter contains the questions necessary to obtain data that will allow employment, income, and local tax impact measures to be derived. All of the major port-related firms in the region are being sent this questionnaire.

All of the information derived from the returned questionnaires will be held in the strictest confidence by the Port. The study's findings will be presented in aggregated forms -- no information for an individual firm will be released or used in any way other than in the determination of the highly aggregated impact measures (e.g., total income, total employment, and total tax impacts).

If you have any questions concerning the questionnaire or how you should design your responses to the questionnaire, please contact Mr. Delbert Doe at the Port of Daly City. His telephone number is (415) 987-6543. Please return the completed survey by August 12.

Thank you very much for your cooperation. Completion of this questionnaire will assist Port efforts in providing improved services for its clients and in increasing economic benefit to the surrounding region. A copy of the results of this study will be sent to you in approximately six months when the study is completed.

Sincerely,

Bill "Bilge Rat" Brown
Director, Port of Daly City

BBRB/ck

Attachment

SURVEY DESIGN

Step B:6

PURPOSE:

Identify firms and potential respondents within the port industry.

DATA REQUIREMENTS:

Lists of potential respondents from the following sources: knowledge of port employees (e.g., the traffic manager's client list), West Coast Marine and Transportation Directory, Dun & Bradstreet Directory, telephone directories, business license records, local Chamber of Commerce.

RECOMMENDED ACTION:

The purpose is to identify all respondents within the geographic area to be covered by the study. Therefore, it is necessary to review several sources to insure that all possible respondents are listed.

Standard Industrial Classification (SIC) categories for the port industry are given in the glossary. Separate lists of firms in each category (and even for firms in subcategories -- e.g., tug operators, barge operators, etc.) should be prepared from the above sources. Any information available about the firms -- e.g., annual sales, employment, etc. -- should also be included on these lists.

The firms should be ranked within each category according to number of employees, from largest to smallest. If employee counts cannot be obtained from published sources or estimated from experience, phone calls should be made.

Lists should include names, addresses, telephone numbers, and a contact person within each company. Because of the information to be requested the contact person should be involved in either the financial or operational affairs of the company.

USE OF RESULTS:

The lists will be used both as master lists from which survey respondents will be drawn and as the basis from which the impacts represented by survey responses will be translated into total direct impacts.

PORT-DEPENDENT INDUSTRY:

A complete list of port-dependent industry firms will generally be more difficult to obtain than a similar list for the port industry firms. This is especially true if containers are moved through the port since there may be less certainty concerning the identity of the shipper. The same sources of information should be used to obtain the port-dependent industry list.

SURVEY DESIGN

Step B:7

PURPOSE:

Select respondents from the list prepared in Step B:6 for the pre-test of the survey instrument and for implementation of the survey.

DATA REQUIREMENTS:

The list of potential respondents in each category developed in Step B:6.

RECOMMENDED ACTION:

For the pre-test some respondents in all categories should be contacted. We suggest distribution of approximately 15-20 pre-test questionnaires.

USE OF RESULTS:

The list produced in this step will be used for the pre-test.

PORT-DEPENDENT INDUSTRY:

The recommended action should be followed for the port-dependent industry survey and the port industry survey.

SURVEY DESIGN

Step B:8

PURPOSE:

Determine whether mail, telephone, or personal interviews, or a combination of these methods will be used for both the pre-test and the actual distribution of survey instruments.

DATA REQUIREMENTS:

None.

RECOMMENDED ACTION:

There is a trade-off among the alternatives in terms of cost versus percentages of response and accuracy of responses. Mail interviews are the least expensive but also have the lowest response rate and tend to have the least accurate responses. Personal interviews are the most expensive but have substantially higher response rates and generally provide more accurate information. Telephone interviews strike a middle ground.

If telephone or personal interviews are to be used the interviewer must have some knowledge of the purpose of the survey and of the appropriate way for recording information. Otherwise, the port's reputation might be damaged and inaccurate information collected.

Because the justification for a pre-test is to determine whether the survey instruments can be understood and completed by respondents, some of the pre-test surveys should be conducted in person. However, if it is decided that mail surveys will be used for the main surveying effort, some pre-test surveys should be mailed and their responses compared with those developed during personal interviews to assess the appropriateness of the survey and the respondents' ability to comprehend it.

A port's selection of a survey method should be guided by its budget limitations, the number of potential respondents, and the desired degree of accuracy. Where the number of potential respondents is small, a personal survey should be conducted because of the better response rate and greater accuracy it should generate. The next best alternative is a telephone interview.

If personal or telephone surveys are to be used, the survey instrument should be distributed in advance, in order to allow the respondent to collect the necessary information. An appointment for the personal or telephone interview should be made.

USE OF RESULTS:

Both the pre-test and the actual survey will be conducted according to the decisions made in this step.

PORT-DEPENDENT INDUSTRY:

The recommended action should be followed for the port-dependent industry survey and the port industry survey.

Step B:9

PURPOSE:

Conduct the pre-test and alter the questionnaire as required.

DATA REQUIREMENTS:

The survey for port industry respondents developed in Steps B:2 and B:3. Also, decision reached in previous steps regarding method of interviews, etc.

DISCUSSION:

The purpose of the pre-test is to insure that respondents are capable of understanding the questionnaire as prepared and that they will provide the desired information. It is imperative that a pre-test be conducted since without one, a survey that results in incorrect information or does not generate a response from the firms surveyed could be conducted.

RECOMMENDED ACTION:

The pre-test should be conducted during one-two week period using the interview techniques selected during Step B:8. Potential respondents should be informed through a variation in the cover letter that this is a pre-test and that the port is as interested in their comments about the questionnaire and the method of conducting the survey as it is in their actual responses.

If some of the pre-test firms are to be contacted by mail, the port should telephone those who have not responded within a reasonable time and ask them to complete the survey.

As the pre-test forms are completed, they should be reviewed to determine which of the responses are similar to those anticipated by the port and any differences should be resolved by recontacting the respondent. If the responses to the pre-test are correct, they should be retained for tabulation along with the responses to the complete survey. This is particularly important for small ports where the number of potential respondents is limited and large percentages of them may be contacted during the pre-test.

USE OF RESULTS:

If respondents are found to have any problems understanding and completing the survey forms regardless of the method of interview, the survey forms should be revised to correct the problems. If some of the difficulty relates to the unwillingness of the pre-test firms to divulge some information, the port must determine whether the possibility that some firms will refuse to complete any part of the questionnaire because of inclusion of this information is greater than the value that receipt of the information from some firms might have for completion of the analysis.

PORT-DEPENDENT INDUSTRY:

The recommended action is the same for the port-dependent industry. The pre-tests can be conducted concurrently to compress the time required for the study.

SURVEY DISTRIBUTION

Step C:1

PURPOSE:

Advertise the study and its value so that potential survey respondents will know about it before the surveys are distributed.

DATA REQUIREMENTS:

None.

DISCUSSION:

A problem with the use of a survey to collect information about port industry and port-dependent industry firms is that the response rates to such surveys are usually low. By promoting the study before the surveys are distributed, the port can generate interest in and knowledge of the study, thereby increasing the response rate.

RECOMMENDED ACTION:

If the port has a newsletter, mention of the study and survey should be made in the edition prior to the start of the survey. Use of other media, such as newspapers, etc., is warranted if the size of the survey is large or as part of a general promotion effort. A local chamber of commerce or business association might also be an appropriate forum for promoting the study.

USE OF RESULTS:

If successful, the publicity will generate interest about the study and lead to a higher response rate for the survey.

SURVEY DISTRIBUTION

Step C:2

PURPOSE:

Prepare a list of respondents selected from those identified in Step B:6 to be used to list contacts, responses, etc.

DATA REQUIREMENTS:

The list of potential respondents selected in Step B:6.

DISCUSSION

Since follow-up contact with firms that do not immediately respond to the survey is recommended it is necessary to prepare a list which can be used to monitor the dates of survey distribution, follow-up contacts, survey receipt, and recontact with the firm to check responses.

RECOMMENDED ACTION:

The number of questionnaires to be distributed for the full survey should be determined through consideration of the number of firms on the list, the expected response rate, the time and money available for the study, and the desired accuracy (confidence) of the estimates provided.

In other studies the response rate of firms in the port industry to mail questionnaires has been about 15-50%, depending on the classification of the business, length of the survey, follow-up efforts, etc.

The sample size of a survey does not necessarily influence the accuracy of the survey; more correctly, it affects the confidence the researcher has in the accuracy of the derived estimates. Generally, the more information obtained from the survey procedure the more confident the researcher is that the sample information accurately reflects the total population.

The level of confidence the researcher has concerning the accuracy of a given sample is generally expressed in percentage terms. For instance, a 95% confidence interval is a range of values -- e.g., number of employees -- between which the average value will fall 95% of the time. This means that if new samples were randomly drawn and average values computed, the average value would fall in that range 95% of the time.

The number of respondents necessary to achieve a 95% confidence level (or any other confidence level) is dependent upon the distribution of values from which the researcher is sampling. Without having some information

about the characteristics of this distribution, it is impossible to determine the minimum number of respondents to achieve a given confidence level.

For surveys aimed at studying a very large population, 30 respondents called serve as a bare minimum for the researcher. Assuming a 15-50% response rate 60-200 questionnaires would have to be distributed. Obviously, for industries with less than 30 firms, questionnaires should be sent to all firms in the industry and extra effort expended in assuring a high response rate. For the rare cases in which there are larger populations judgment must be utilized in determining the number of surveys to be mailed and the amount of effort to be expended in assuring a high response rate. If the researcher feels that the firms within a given population (i.e., industry) are all similar in size and operation then a smaller sample (less than 30 firms surveyed) can be justified. If, on the other hand, there is a wide disparity in the size of firms within an industry more than 30 surveys must be collected and more care taken in their analysis.

In the case of a large number of firms within an industry, those to be sent a survey should be randomly selected -- e.g., assign each firm a number and then select firms through the use of a random number table.

In such cases, the accuracy of the results can be improved if all those firms thought to account for a significant percentage of the business are contacted outside of the randomly generated list.

The port should prepare two separate charts, one for the port industry and one for port-dependent firms, which will allow the port to keep dates of important events in the survey. An example is shown in Exhibit C:2-1.

When any of the events mentioned in the form occurs, it should be marked in the chart.

USE OF RESULTS:

The chart should be used throughout Parts C and D to record the date of events concerning the surveys. It can also be used to determine the percentage responses to the survey.

EXHIBIT C:2-1

SAMPLE SURVEY RESPONSE CHART

<u>FIRM/CONTACT/PHONE #</u>	<u>SURVEY DISTRIBUTION DATE</u>	<u>FOLLOW-UP CONTACTS</u>	<u>SURVEY RECEIPT DATE</u>	<u>RECONTACTS</u>
1. Acme Trucking Willie Smith 849-6573	8/4	8/13 8/20	8/22	9/5
2. JGV Barge Co. Hector Viez 547-1100	8/4	8/13	8/19	***
3. Bay Tug Co. Simon Peet 445-2300	8/5	8/14 8/22	NR	
4. Chang's Chandlery James Chang 926-4210	8/6	8/15 8/22	8/29	***
5. Union Stevedores Wilma Jones 392-1000	8/6	8/15		

NR - No response

*** - Recontact not necessary

SURVEY DISTRIBUTION

Step C:3

PURPOSE:

Distribution of the survey instrument and assurance of the highest possible response rate.

DATA REQUIREMENTS:

The list of respondents selected in Steps B:6 and C:2.

DISCUSSION:

This step is very similar to Step B:9 with the exception that more effort should be extended to assure a high response rate, especially among firms that constitute a large share of employment in their industries within the region.

RECOMMENDED ACTION:

The survey should be distributed in accordance with Step B:9. It is expected that a mail survey will be used for the majority of firms, although firms that are particularly large, important, or sensitive should be contacted personally. An intermediate alternative would be telephone interviews, but it should be remembered that they are more costly than mail surveys.

The cover letter states that the surveys should be returned within one to two weeks. Firms that have not returned surveys by the specified cut-off date should be recontacted by telephone to ascertain the reason the survey was not returned. If the firm is having difficulty interpreting the questionnaire, efforts should be made to explain what further information is required. If the firm does not want to divulge information it believes is sensitive, an effort should be made to explain that the information will be aggregated so that individual firms cannot be identified.

It may be impossible to convince certain firms that this information will not be misused. In this case, an effort should be made to obtain a minimum amount of information. This would include the activities of the firm, so as to determine the SIC code, and sales/revenues employment and payroll data. This will allow employment and payroll impacts to be calculated. It is most efficient to attempt obtaining the reduced amount of information during the follow-up telephone call to firms that did not respond to the interview.

USE OF RESULTS:

These surveys will provide base data for compilation of direct impacts and the calculation of secondary impacts.

SURVEY RESULT COMPILATION

Step D:1

PURPOSE:

Put survey responses in a form more convenient for "by hand" and computer analysis.

DATA REQUIREMENTS:

Completed survey questionnaires, Standard Industrial Classification Manual, and Exhibits B:4-1 and B:4-2 (for the port-dependent industry surveys).

DISCUSSION:

In order to reduce errors in the tabulation of data from a large number of firms, questionnaire coding is recommended. It is necessary if the responses are to be computerized.

RECOMMENDED ACTION:

It is strongly recommended that the coding strip along the right hand edge of the questionnaire be used to record responses. This permits rapid keypunching of the data if computer tabulation is to be used. Missing data can be noted with paper clips along this edge.

The coding instruction provided in Step B:4 should be followed in this step.

USE OF RESULTS:

The coded questionnaires will be checked and modified in the following steps. Any changes in responses or additional responses should be coded using the format of Step B:4.

SURVEY RESULT COMPILATION

Step D:2

PURPOSE:

This is an optional, but strongly recommended, step aimed at checking the consistency of responses within individual surveys and among surveys.

DATA REQUIREMENTS:

Coded survey questionnaires; additional financial information for specific firms; general information for individual industries from government documents -- e.g., income/employee ratios.

DISCUSSION:

Consistency checks at this stage of the analysis are important for two reasons. First, checks must be conducted to prevent misinterpretations from being carried through the remainder of the analysis; questions that have been answered incorrectly must be found and the reason for the misinterpretation must be determined to make certain that the survey is functioning as anticipated. Second, it is critical that errors be corrected so that they are not carried through the remainder of the analysis.

A variety of checks can be instituted; the extent of testing for consistency will vary according to the time and money allocated for the study, the confidence the researcher has in the accuracy of the survey responses, and the quantity and quality of corroborating information that can be obtained for the respondent firms.

RECOMMENDED ACTION:

The following consistency checks can be undertaken:

1. A comparison of annual sales or revenues (3) with the sum of payroll (5), purchases (6a,b,c), and taxes and fees (8a,b,c,d). If the numbers are widely divergent the firm should be recontacted to determine if the disparity is due to business conditions or error in completion of the survey.

2. A comparison of the average annual wage (response 5 divided by response 4) with published wage information for the specific industry. Industry specific wage information (for production workers) is obtainable from Employment and Earnings published monthly by the U.S. Department of Labor, Bureau of Labor Statistics (for Canada -- Employment, Earnings, and Hours published by Statistics Canada). Obviously full-time equivalent employees would have to be used in this determination. Wide divergence would point toward recontact with the respondent firm.
3. The responses of firms within an industry, especially firms of similar size, should be compared to determine divergences. Any "oddities" should be recontacted to assure response accuracy.

USE OF RESULTS:

The recommended actions listed above should be used to check the accuracy and consistency of the responses so that errors are not carried through the analysis. Recoding of the questionnaires should be done where necessary.

SURVEY RESULT COMPILATION

Step D:3

PURPOSE:

Estimate the value of missing responses on partially completed questionnaires. Incomplete responses reduce the quality and quantity of the data available for analysis.

DATA REQUIREMENTS:

Coded survey questionnaires.

DISCUSSION:

This step necessitates the use of a great deal of judgment. Only basic guidelines can be provided with respect to the estimation of missing data. Above all it should be kept in mind that the aim of this step is to retain information that would otherwise be lost if a partially completed questionnaire had to be discarded because of missing responses. If the questionnaire has very little information (i.e., many uncompleted portions), attempts at estimating the non-responses should be forgone. In addition, firms which are unique, because of either their size or product/service rendered, should not have missing questions estimated unless there is a strong feeling that the estimate is reasonably accurate.

RECOMMENDED ACTION:

It should first be determined that estimating missing responses is of sufficient importance to justify the effort. Often it is more advantageous to discard the questionnaire; if the response rate is high no problem will be created by this action.

There are two approaches to estimating missing information after exhausting the possibility of obtaining the information directly from the firm. The first approach is to obtain the information from other sources -- e.g., total sales and employment could be obtained from the firm's latest 10K form (available upon request) if the firm is required to submit the form, from its annual report, or from Dun and Bradstreet's Million Dollar Directory, and property tax information could be obtained from the county assessor's office in the United States or from the Attorney General's Department in Canadian provinces.

The second approach entails the use of information from other completed surveys to estimate missing information on partially completed response forms. If, for instance, payroll data were not presented for firm X, it is possible that the average wage of firm Y employees could be multiplied by the number of employees listed for firm X in order to derive a total payroll for firm X. Great care must be taken when estimating missing information in this manner, however. If possible, average values derived from a number of similar firms should be used rather than information from a single firm. In addition, the firms should be in the same industrial category and of approximately the same size. This procedure should not be employed in the derivation of property tax information, rental payments, or services purchased from regional businesses (unless the researcher can be certain that the same share is purchased locally).

USE OF RESULTS:

This step acts to reduce the number of questionnaires that must be sent out and prevents the potential loss of information from discarding partially completed questionnaires. After coding the changes the questionnaires are ready for tabulation in Step D:5.

SURVEY RESULT COMPILATION

Step D:4

PURPOSE:

Collect employment and income information for the port conducting the economic impact study.

DATA REQUIREMENTS:

The port's most recent annual auditor's report supplemented by employment data.

DISCUSSION:

The operation of the port itself represents a significant impact in the local community; therefore, similar information to that obtained from the surveys must be collected and coded.

RECOMMENDED ACTION:

The short survey form should be completed with the port operation being treated as a firm. Care must be taken to exclude non-waterborne commerce related costs and employment. These would include costs, revenues, and employment attributable to aviation or airport operation, industrial land leasing, and non-waterborne commerce related economic development activities. There will be difficulty in separating out non-waterborne commerce related costs and especially employment since administrative activities are often not separated into waterborne commerce versus non-waterborne commerce categories. Attempts should be made to estimate the share of time spent on non-waterborne commerce related activities for individuals whose activities span many areas.

USE OF RESULTS:

After this information is coded onto a survey form the information will be tabulated along with other survey information in the following step.

SURVEY RESULT COMPILATION

Step D:5

PURPOSE:

Tabulate survey results by industry and impact category as a prelude to the determination of the direct economic impacts, including employment, income, and tax impacts.

DATA REQUIREMENTS:

Coded surveys separated by industry (i.e., type of firm) and ordered by number of employees; original list of firms from which the sample was drawn; and the latest issue of County Business Patterns published annually by the U.S. Department of Commerce (obtainable from a local library, college library, or directly from the U.S. Government Printing Office).

DISCUSSION:

This tabulation step must be conducted prior to the final tabulation of the direct impacts since it is necessary to use information from the surveys to estimate the non-surveyed firms' sales, employment, payroll, taxes, etc. This is the purpose of doing a sampled survey of firms rather than an exhaustive survey of all of the waterborne commerce related firms. If the survey has been correctly administered and the response rate was high then a large percentage of the total waterborne commerce related economic activity will have been accounted for in the survey responses.

RECOMMENDED ACTION:

Partition the original master list of firms by industry into employment size classifications (by industry). An example of a suitable partitioning is used in County Business Patterns.

1-4	Employees
5-9	Employees
10-19	Employees
20-49	Employees
50-99	Employees
100-249	Employees
250-499	Employees
500-999	Employees
1000+	Employees

The County Business Patterns breakdown of firms by employment size class can also serve as a useful check on the total number and size of firms in the port industry or port-dependent industry. There is no Canadian publication that provides similarly formatted information, so this optional checking procedure cannot be performed in Canada unless locally produced listings of firms and their employment are available. Note that the number and size of firms could have changed from the publication of the latest County Business Patterns and compilation of the original master list of firms in Step B:6.

There is also a potential technical problem with County Business Patterns. If a firm does not have individuals on the payroll during the time that the County Business Patterns survey of firms is conducted, but has a payroll during other times during the year the firm will be lumped into the "1 to 3" category.

The completed surveys should be partitioned in the same manner -- i.e., by industry and employment size class. This allows a comparison of the survey sample with the total population of firms by industry and employment size class. Smaller regional economies will, of course, demand more aggregated industrial and employment categories.

A tabulation of survey responses would then be conducted by industry and employment size class. This would allow average values of the responses -- e.g., sales, employment, payroll, and taxes to be determined. These average values would be utilized as surrogate values for firms that were not surveyed, thereby "expanding" the survey information to the entire universe of firms. It is critical that the industry and employment size classes be constructed to reflect small differences among the firms. The finer the categories, the more accurate the impact study; unfortunately, increasing the number of categories also increases the number of firms that must be surveyed. In addition, it is also extremely important that the larger firms be surveyed since the accuracy of information obtained about them has a much greater effect on the final economic impacts than information concerning smaller firms.

In industry categories for which no questionnaires were returned, the analyst has three alternatives: (1) to attempt to obtain information through telephone or personal interview if these have not been tried; (2) to estimate sales and payroll from employment by using state (province) or national sales/employee and payroll employee ratios; or (3) to disregard the impact from that industry category.

In the special case where there is more than one port in a region the step involving expansion of survey results to the entire universe of firms must be followed by an allocation to specific ports. This can be accomplished in a variety of ways. The simplest, although least desirable, method is to allocate a firm's employment income, etc., by the relative tonnage share of cargo moving through each port. If firms could be disaggregated by the type of cargo they are involved with (containers, etc.) a similar procedure could be done with the relative tonnage share of each generic type of cargo. In a similar manner, firm's dealing with vessels only (i.e., tug companies) could have their estimated responses

allocated by the number of vessels calling at each port. A completely different allocation method uses the "average" allocation derived from response to the survey question asking for the percentage of business attributable to each port. All of these allocation methodologies can and should be modified by any special knowledge the analyst has concerning individual firms.

USE OF RESULTS:

The survey responses and estimated "responses" of the firms which were not surveyed represent the basic information used in the estimation of total direct impacts in the next step.

SURVEY RESULT COMPILATION

Step D:6

PURPOSE:

Aggregate survey responses and calculate a variety of direct impact measures.

DATA REQUIREMENTS:

Coded survey forms and estimated responses for non-surveyed firms (see Step D:5).

DISCUSSION:

If the preceding steps have been executed with care the calculation of the direct impacts will be easily accomplished and will be accurate within the limits accepted for this study. Obviously, if the list of firms is incomplete the impacts will be understated. The coding strip along the edge of the survey form is a data processing aid. Computerization of the survey information may allow for the realization of time savings in impact calculation for larger ports. This is not a necessity, however.

RECOMMENDED ACTION:

1. Employment Impacts

The employment impact is simply the sum of employees listed in response to question 4 plus the estimated number of employees for the firms not surveyed. The most accurate impact measure is the number of full-time equivalent employees, since the addition of part-time employees directly into an impact measure overcounts the number of jobs related to water-borne commerce. If the respondent uses blanks 4a, 4b, and 4c instead of blank 4 the number of full-time equivalent employees must be estimated. If the respondent cannot be recontacted to obtain the information -- i.e., what is the average amount of time part-time and contract employees spend at your firm compared to full-time employees -- estimates must be made. This can be accomplished by obtaining the average wage for the industry (state average wage data or national average wage data, from Employment and Earnings, or in the case of Canadian ports from Employment, Earnings, and Hours) and comparing this figure with the average wage determined for the surveyed firm. Simply divide the total payroll (#5) by the sum of 4a, 4b, and 4c; if the calculated wage is lower than the published figure the sum should be reduced to reflect the existence

of part-time employees. If the calculated average is higher than the published average the calculated employment should be considered full-time equivalent, unless it is substantially higher. In the latter case the survey should be examined for coding errors and consistency (see Step D:2).

2. Income Impacts

Total direct payroll impacts are the sum of responses to question 5 plus the estimated responses of non-surveyed firms. This impact can also be called an "income" impact, as long as it is noted that benefits have been included in the figure and that non-payroll types of income (e.g., property income and profits) have not been included.

3. Tax Impacts

Tax impacts should be broken out by type of tax since the tax revenues accrue to a variety of agencies. In summing the tax revenue survey responses and estimates of non-surveyed firms' responses it is important that the researcher be certain to whom the tax accrues. For example, it would be incorrect to state that waterborne commerce related activities generate \$xxx,xxx in sales tax revenue for Alameda County, California, since the local governments receive only 16.7% of the sales tax revenue. Similarly, property tax revenues must be attributed to the various county and municipal governments. Moreover, unless responses have been received from firms representing the vast majority of economic activity in an industry, attempts to estimate total tax impacts are probably unwise.

4. Sales Impacts

Total direct sales impacts -- i.e., sales generated by waterborne commerce related activity -- can be calculated from responses to question 3 of the survey, but care should be exercised to not double count sales. This is a special problem with respect to freight forwarders; their sales may include a wide range of costs that are counted as sales by other waterborne commerce related firms. Sales/revenue responses must be adjusted to remove double counting. The responses to question 7 will be of assistance in determining the presence of double counting. For instance, if tug boat services are included as part of the answer to question 7 on a freight forwarder's questionnaire it will be necessary to reduce the firm's sales revenue to reflect this. Since the questionnaire does not provide specific purchase information, assumptions must be made as to how much revenue is double counted. It may be necessary to subtract the figures provided in response to questions 6a, 6b, and 6c in order to remove double counting. In addition to double counting problems with freight forwarders it should be remembered that questionnaires from firms leasing facilities or being provided services by the port will have to be scrutinized to prevent double counting of sales/revenue impacts since the port will have counted the cost of these services as part of its revenue.

If direct sales/revenue impacts are to be used as input for the RIMS methodology (see Step F:3) summations must be done by industry rather than by aggregating all industries.

If the RIMS methodology is going to be used, it may be advisable to conduct an additional test for double counting of sales. Two or three respondent firms in industries for which this may be a problem (e.g., freight forwarders) can be contacted and interviewed to determine what, if any, other port industry revenues have been included in reported totals. A sales/employee ratio can be developed from this information and used to check the responses of other firms in the same industry for consistency.

In the case of regions with more than one port, allocations of impacts to each port should be made. This allocation is done prior to the summation of total direct impacts through the use of responses to the survey question asking for an allocation of activity to various ports. See Step D:5 for additional information.

USE OF RESULTS:

The aggregated impact measures will be used as data for publication and as data needed for the determination of secondary impacts.

DEVELOPMENT OF SECONDARY IMPACT MULTIPLIERS

Step E:1

PURPOSE:

Select that method or methods which will be used to calculate secondary impacts.

DATA REQUIREMENTS:

None.

DISCUSSION:

This kit contains directions for calculating secondary economic impacts by two methods -- economic base multipliers and input/output multipliers. The advantages and disadvantages of each approach are discussed in Chapter II. The specific techniques described below are:

- An economic base income multiplier derived from the consensus of three different employment multipliers, and
- An output multiplier derived from an input/output table (Bureau of Economic Analysis RIMS multipliers for United States "kit" users and regional input/output tables for Canadian kit users).

We believe the most accurate results can be obtained by following all of the steps and comparing the results of the two approaches. However, a less ambitious program may be more in keeping with an individual user's needs. If the purpose of the study is to describe direct activity with little emphasis on secondary impacts, the time and effort involved in completing all of the secondary impact steps is probably not warranted. Similarly, time, staff, or budget constraints may require a modified approach. In such cases, it is reasonable to select a single approach, and even a single technique for calculating the employment multiplier, as long as the limitations and probable biases of each approach are recognized and cited in the impact report.

Some Canadian ports may not have suitable regional input/output studies available to them. Large ports could make use of the interprovincial input/output model published by Statistics Canada. The structural Analysis Division of Statistics Canada in Ottawa should be contacted for further information concerning the use of the interprovincial model.

RECOMMENDED ACTION:

If the port chooses not to follow the complete methodology, the selection of the individual technique can be based on available resources. The techniques for calculating an economic base multiplier require very little money to obtain required data, but do require a fairly substantial investment of staff time. The RIMS input/output multipliers require an initial purchase price of about \$1,000, but no staff time is required for their calculation. An examination of the remaining steps in this element will help the user decide which technique is more compatible with the port's purposes and resources.

USE OF RESULTS:

The decisions made in this step will guide the implementation of the secondary impact analysis.

DEVELOPMENT OF SECONDARY IMPACT MULTIPLIERS

Step E:2

PURPOSE:

Collect income and employment data necessary to calculate economic base multipliers.

DATA REQUIREMENTS:

U.S. Department of Commerce, Bureau of the Census, County Business Patterns, available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402.

U.S. Department of Commerce, Bureau of Economic Analysis, Regional Economic Measurement Division, Local Area Personal Income, available from National Technical Information Service, Springfield, VA, 22161.

For Canada -- Statistics Canada, Canadian Census, Vol. III, Part 4. Industries by Sex for Census Metropolitan Areas, Place of Residence and Place of Work (Bulletin 3.4-5), and Industries by Sex for Census Agglomerations of 25,000 and over (Place of Residence), and Census Agglomerations of 50,000 and Over (Place of Work), (Bulletin 3.4-6).

RECOMMENDED ACTION:

The basic published data needed to calculate employment and income multipliers for the port district county(s) should be obtained. The most recent issues of County Business Patterns for the state in which the port is located and the United States as a whole should be ordered from the Government Printing Office. The BEA income data for the port county should also be ordered. The NTIS publication numbers are:

- Volume I -- Summary Including Methodology and Classification of SMSAs and BEA regions -- PB291164
- Volume II -- Northeast Region -- PB291165
- Volume III -- Mideast Region -- PB91166
- Volume IV -- Great Lakes Region -- PB291167
- Volume V -- Plains Region -- PB291168
- Volume VI -- Southeast Region -- PB291169
- Volume VII -- Southwest Region -- PB291170
- Volume VIII -- Rocky Mountain Region -- PB291171
- Volume IX -- Far West Region -- PB291172
- Entire Set -- PB291163-SET

Publication of both sets of data takes about one and one-half years (i.e., 1977 data should be available in mid-1979). Since it is important to use employment and income data for the same year, the user should check with the Department of Commerce to find out the most recent year for which both are available before ordering publications.

The Canadian Census Vol. III, Part 4 Bulletins 3.4-5 and 3.4-6 should be obtained by Canadian ports. The volumes contain employment data by industry for urban areas. The latest census information is from 1971 as of this printing, making it somewhat dated, but no other publication provides sufficient detail.

USE OF RESULTS:

These data will be used in the calculations of employment and income multipliers for secondary impacts.

DEVELOPMENT OF SECONDARY IMPACT MULTIPLIERS

Step E:3

PURPOSE:

Develop employment multipliers based on the "concentration" technique.

DATA REQUIREMENTS:

Most recent County Business Patterns for the port's state and the United States summary; Census Vol. III, Part 4 Bulletins 3.4-5 and 3.4-6, and Canadian Statistical Review for Canadian port users.

DISCUSSION:

This technique, also known as location quotients, is used to determine the basic and non-basic shares of employment in each industry by comparing the port community or region's employment distribution to national employment distribution. The underlying assumption is that if a community is highly specialized relative to the nation in the production of a particular commodity, that commodity is presumed to be an export item (e.g., automobiles from Detroit). If local residents have the same demand patterns that prevail nationally (as is assumed), a self-sufficient community should have the same employment distribution as the country as a whole. If 2% of U.S. employment is in apparel manufacturing, for example, then a 2% share in a given community would indicate just enough employment to meet local demand. If the local share exceeds 2%, the excess employees are assumed to serve export demand. (Also, if the local share is less than 2%, imports would be required to meet local demand, but this is not of concern in this calculation.)

The most significant criticism of the concentration technique is that it understates basic employment and thus overstates the employment multiplier because it cannot adequately treat differences in product mix. In the case described above, even though 2% of the community's employment was in the apparel manufacturing industry, it might all be accounted for by a single firm which produces swimwear, most of which would be exported. Even data disaggregated to the four-digit SIC level group together several different products and often several brands of each product. This product mix factor causes the concentration technique to understate the volume of exports. Comparisons of basic employment derived through this approach and estimates derived from direct surveys of local industries indicate that in each case the concentration technique yields a lower estimate of export levels. As a result, the employment multiplier and the estimate of secondary impacts will be overstated. Nevertheless, this approach is an inexpensive way to estimate the employment multiplier as long as its limitations are recognized.

RECOMMENDED ACTION:

To calculate the number of "basic" employees in each SIC industry, it is necessary to apply the national percentage of employment in the industry to total employment in the county and compare this number to actual county employment in the same SIC. If actual employment is less than or equal to the calculated number of employees, this employment is considered completely non-basic. If actual employment is greater than the calculated number, the difference (actual minus calculated) is basic employment. Exhibit E:3-1 illustrates the application of this technique. After the process has been repeated for each local SIC industry, the results are summed and all employment is assigned to either the basic or non-basic sector. The economic base multiplier itself is calculated by dividing total employment by basic employment. For the purposes of this analysis, basic and non-basic employment should be summed for each of the major industrial divisions -- agriculture, forestry, and fisheries; mining; contract construction; manufacturing; transportation, communications, and utilities; wholesale and retail trade; finance, insurance, and real estate; and services.

It is important to note that national employment data are disaggregated to the four-digit SIC level, but data for counties are frequently presented in more highly aggregated form because of disclosure problems or the absence of certain industries. The procedure described above must therefore be adjusted to make sure that similar employment groupings are being compared. In the example in Exhibit E:3-1, for instance, national and county employment in SIC 209 can be compared directly. However, no county data are reported for the remaining three-digit SICs in this category (201-208). The proper comparisons would therefore be between U.S. and county employment in the two-digit SIC 20 minus employment in SIC 209. In the example, U.S. employment for this group would be 2.14% (2.36%-0.22%) for a calculated county employment of 362. As a result, all 121 actual county employees (285-164) would be assigned to the non-basic sector.

Canadian ports must make a further calculation in order to adjust basic employment to account for foreign exports. Since approximately one-fifth of Canadian GNP is accounted for by exports, the economic base multipliers will tend to be overstated if not adjusted to account for production for foreign export, which is often incorporated into the non-basic sector of the regional economy. The simplest adjustment procedure uses an export/GNP ratio (as derived from data in the Canadian Statistical Review) to determine the number of employees producing products for foreign export. The remaining employment is disaggregated into basic and non-basic categories as above, but before the multiplier is calculated the foreign export employment is summed with basic employment. This can also be accomplished by the following computation:

$$\text{multiplier} = \frac{T}{(e \times T) + (1 - e) \times B}$$

where T = total employment

B = basic employment

e = exports/gross national product

If more accuracy is desired, a regional exports to gross regional product ratio can be used. Provincial data may have to be used if regional exports and product statistics cannot be obtained. A further elaboration would be to use the same procedure at an industry level, i.e., to net out foreign export-related employment for each industry.

USE OF RESULTS:

The employment assignments developed in this step will be used in the derivation of the income multiplier in Step E:7.

CONCENTRATION TECHNIQUE CALCULATION

GRAYS HARBOR COUNTY						
SIC	U.S. Percent	Calculated	Actual	Basic	Non-Basic	
TOTAL	100.00%	16,902	16,902	8,400	8,502*	
09 Agriculture, Forestry, Fisheries	0.36	61	176	4	56	
09 Fishing, hunting, and trapping	0.03	5	116	111	5	
Contract Construction	5.50	930	501	---	46	
15 General contractors	1.47	248	239	---	239	
17 Special trade contractors	2.84	480	216	---	147	
173 Electrical work	0.51	86	69	---	69	
Manufacturing	30.27	5,116	8,204	---	359	
20 Food and kindred products	2.36	399	285	---	121	
209 Misc. foods and kindred products	0.22	37	164	127	37	
24 Lumber and wood products	1.01	171	5,893	162	47	
241 Logging camps	0.13	22	2,766	2,744	22	
242 Sawmills and planing mills	0.33	56	1,915	597	54	
2429 Special product sawmills	0.01	2	1,264	1,262	2	
243 Millwork, plywood & structural members	0.27	46	1,003	283	46	
2436 Softwood veneer and plywood	0.06	10	674	664	10	
26 Paper and allied products	0.98	166	1,262	1,096	166	
27 Printing and publishing	1.73	292	111	---	111	
35 Machinery, except electrical	3.18	537	294	---	294	
Transportation and Other						
Public Utilities	6.33	1,070	690	---	83	
42 Trucking and warehousing	1.73	292	338	---	---	
421 Trucking, local & long distance	1.56	264	338	74	264	
44 Water transportation	0.30	51	65	14	51	
48 Communication	1.81	306	204	---	204	
Wholesale Trade	7.11	1,202	563	---	---	
50 Wholesale trade - durable goods	3.89	657	308	---	139	
501 Motor vehicles & automotive equipment	0.65	110	76	---	76	
508 Machinery, equipment & supplies	1.50	234	93	---	93	
51 Wholesale trade - nondurable goods	2.88	487	255	---	80	
514 Groceries and related products	0.93	157	113	---	53	
5146 Fish and seafoods	0.03	5	60	55	5	
517 Petroleum & petroleum products	0.30	51	62	11	51	
Retail Trade	20.71	3,500	3,297	---	80	
52 Building materials	0.71	120	127	19	57	
521 Lumber & other building materials	0.37	63	51	---	51	
53 General merchandise stores	3.07	519	203	---	203	
54 Food stores	3.08	521	616	---	45	
541 Grocery stores	2.62	443	571	128	443	
55 Automotive dealers & service stations	2.76	466	645	---	17	
551 New and used car dealers	1.20	203	315	112	203	
553 Auto and home supply stores	0.31	52	69	17	52	
554 Gasoline service stations	1.06	179	244	65	179	
562 Women's ready-to-wear stores	0.48	81	95	14	81	
57 Furniture and home furnishing stores	0.79	134	121	---	39	
571 Furniture and home furnishing stores	0.48	81	82	---	8	
5712 Furniture stores	0.34	57	74	17	57	
58 Eating and drinking places	5.50	930	1,078	115	61	
5812 Eating places	4.64	784	764	---	764	
5813 Drinking places	0.50	85	138	53	85	
59 Miscellaneous retail	2.63	445	332	---	108	
591 Drug stores	0.74	125	155	30	125	
594 Miscellaneous shopping goods stores	0.69	117	69	---	69	
Finance, Insurance, and Real Estate	7.02	1,187	698	---	58	
60 Banking	1.99	336	202	---	19	
602 Commercial and stock savings banks	1.83	309	183	---	183	
61 Credit agencies other than banks	0.73	123	101	---	30	
612 Savings and loan associations	0.27	46	71	25	46	
64 Insurance agents	0.58	98	59	---	59	
65 Real estate	1.31	221	278	---	50	
651 Real estate operators and lessors	0.68	115	228	113	115	
Services	21.29	3,598	2,718	---	67	
70 Hotels and other lodging places	1.42	240	299	59	240	
72 Personal services	1.41	238	177	---	90	
723 Beauty shops	0.44	74	87	13	74	
73 Business services	3.39	573	173	---	56	
739 Miscellaneous business services	1.50	254	117	---	117	
75 Auto repair, services, & garages	0.71	120	79	---	11	
753 Automotive repair shops	0.45	76	68	---	68	
79 Amusement & recreational services	0.90	152	145	---	50	
799 Miscellaneous amusement services	0.51	86	95	9	86	
80 Health services	6.53	1,104	1,117	---	693	
801 Offices of physicians	0.90	152	101	---	101	
805 Nursing and personal care facilities	1.18	199	323	124	199	
81 Legal services	0.58	98	63	---	63	
83 Social services	1.15	194	98	---	---	
831 Social services, nec	0.92	155	98	---	98	
86 Membership organizations	1.71	289	440	---	40	
863 Labor organizations	0.26	44	78	34	44	
864 Civic and social associations	0.43	73	322	249	73	
89 Miscellaneous services	1.02	172	60	---	60	

* Includes non-classifiable establishments.

DEVELOPMENT OF SECONDARY IMPACT MULTIPLIERS

Step E:4

PURPOSE:

Develop employment multipliers based on the minimum requirements technique.

DATA REQUIREMENTS:

Most recent County Business Patterns for the port's state, the United States summary, and other states, as determined below; Canadian Census Vol. III, Part 4 Bulletins 3.4-5 and 3.4-6. for Canadian port users.

DISCUSSION:

This approach attempts to overcome the principal problem of the concentration technique, which systematically overestimates the multiplier by underestimating basic employment. The underlying assumption of the minimum requirements approach is that the amount of employment in a given industry necessary to serve local demand in a community is equivalent to the smallest amount of employment in that industry in a group of counties of similar size. Any employment in excess of this minimum is assumed to serve export demand.

The problem with this technique, particularly when relatively small communities are being analyzed, is that the sample of communities can be constructed so that there is very little or even no non-basic employment in each industry, so that basic employment is overstated and the multiplier understated. For this reason it is often argued that some cutoff other than the lowest employment share be used -- e.g., the second lowest, the share corresponding to the 5% level, etc. The difficulty with this approach is that by arbitrarily establishing a higher cutoff, the basic share of employment will be lower. Unless some judgment is exercised about what truly represents the minimum requirement for each industry, this technique can be misleading.

RECOMMENDED ACTION:

The first step in determining the minimum share of employment required to serve local demand in each industry is to identify the group of counties (or SMSAs) to which the port community will be compared. The object is to select counties of similar size (measured by employment) with different economic structures. The port analyst should thus select at least some counties in non-coastal states (or some coastal counties in the case of river ports).

The source for selecting these counties is the U.S. summary volume of County Business Patterns. Table 3A presents a list of all United States counties and their total employment. Ten counties (no more than two in any state) with employment similar to the county being analyzed should be selected and the appropriate volumes of County Business Patterns ordered. (This publication is available for examination in Department of Commerce field offices and public libraries in many larger cities. If feasible, it is probably quicker and less expensive to photocopy the few pages of data needed for each of the ten counties than to order County Business Patterns from the Government Printing Office.) In some cases, data availability may dictate a smaller number of comparisons or even suggest that this technique is inappropriate. For example, there are fewer than ten SMSAs with employment close to or larger than one million.

Exhibit E:4-1 is an example of the minimum requirements calculation. For each industry, the lowest percentage of employment (in italics) represents the non-basic share of employment. When this minimum share is found in the port county, there is assumed to be no basic employment in the industry (SIC 17). When port county employment exceeds this minimum share, the difference ($1.41\% - 0.82\% = 0.59\%$ for SIC 15) represents basic employment. After this calculation has been completed for each industry, the results are summed to determine total basic employment for each major industry division. The employment multiplier is calculated by dividing total employment by basic employment. As discussed in the previous step, county data may have to be adjusted so that similar employment categories are compared.

A similar approach should be taken by Canadian users of the kit. Canadian Census employment data for similar "urban areas" should be used in lieu of "county" employment data. The adjustment for foreign exports (see Step E:3) will also have to be made by Canadian users.

USE OF RESULTS:

The employment assignments developed in this step will be used in the derivation of the income multiplier in Step E:7.

MINIMUM REQUIREMENTS TECHNIQUE CALCULATION

SIC	Percent Distribution											Greys Harbor County		
	Greys Harbor	Final AZ	Imperial CA	Napa CA	Maui HW	Bannock ID	Bonnaville ID	Coos OR	Douglas OR	Davis UT	Thurston WA	Total	Basic	Non-basic
Total	100.0%	17,156	16,275	17,320	17,461	15,821	18,775	13,250	20,799	14,683	16,895	16,902	11,010	6,892
Agriculture, Forestry, Fisheries	1.05	0.51	6.34	0.72	0.86	0.19	0.71	2.36	0.89	0.11	4.75	176	41	19
09	0.69	—	—	—	—	—	—	0.60	—	—	0.36	116	116	—
Contract Construction	2.96	2.41	5.14	5.64	7.86	8.38	9.16	3.79	4.89	11.01	6.77	501	—	46
15	1.41	0.82	1.18	1.82	2.99	1.76	2.09	1.34	2.21	3.00	2.37	239	100	139
17	1.28	1.37	2.55	3.23	3.37	3.79	3.85	2.02	1.78	7.34	3.20	216	—	147
173	0.41	—	0.45	0.41	0.46	1.13	0.72	0.53	0.55	0.86	0.55	69	—	69
Manufacturing	48.54	14.59	8.87	24.47	12.66	22.51	10.72	35.71	44.56	17.94	15.31	8,204	—	359
20	1.69	0.99	3.34	5.35	9.83	3.05	5.37	2.66	1.20	—	—	285	—	121
209	0.97	—	—	—	0.30	—	—	1.80	—	—	—	164	164	—
24	34.87	—	—	—	—	—	0.46	28.78	36.44	0.45	4.63	5,893	133	76
241	18.38	—	—	—	—	—	—	8.77	—	—	0.39	2,786	2,786	—
242	11.33	—	—	—	—	—	—	11.11	10.57	—	1.06	1,915	851	—
2429	7.48	—	—	—	—	—	—	—	—	—	—	1,264	1,264	—
243	5.93	—	—	—	—	—	—	—	—	—	2.33	1,003	329	—
2438	3.99	—	—	—	—	—	—	—	18.81	—	—	874	874	—
26	7.47	—	—	—	—	—	—	—	—	—	—	1,262	1,262	—
27	0.66	0.48	0.82	1.13	0.69	0.85	1.12	0.95	1.22	0.98	1.23	111	30	81
35	1.74	0.32	0.38	—	—	—	1.11	—	1.31	1.80	—	294	240	54
Transportation and Other Public Utilities	4.08	2.98	9.79	8.03	8.74	7.91	5.00	7.98	4.91	8.04	5.00	690	—	83
42	2.00	0.74	4.24	—	1.23	3.57	1.94	3.71	1.80	—	1.08	338	213	125
421	2.00	—	2.75	—	1.23	—	1.90	3.71	—	—	1.00	338	—	—
44	0.38	—	—	—	—	—	—	1.03	—	—	—	65	65	—
48	1.21	0.56	—	—	—	—	—	—	1.05	—	—	204	109	95
Wholesale Trade	3.33	2.63	15.71	2.49	3.30	7.97	13.61	6.37	3.40	8.90	4.35	563	—	—
50	1.82	1.54	—	1.42	—	4.03	6.49	2.88	2.27	—	2.40	308	19	120
501	0.45	—	0.93	—	0.35	0.82	0.67	0.72	0.36	0.91	0.34	76	19	57
508	0.55	1.16	2.00	0.88	—	1.92	3.28	1.18	0.86	0.37	1.02	83	30	63
51	1.51	1.09	10.90	1.07	2.07	3.94	—	—	1.13	4.92	—	255	—	80
514	0.87	—	8.86	—	1.41	1.82	4.05	0.66	—	—	0.66	113	—	53
5146	0.35	—	—	—	—	—	—	—	—	—	—	60	60	—
517	0.27	0.41	0.53	—	—	0.63	1.16	—	0.56	0.94	—	62	—	82
Retail Trade	19.51	16.28	34.49	26.67	30.10	27.00	22.85	25.08	21.31	30.97	29.82	3,297	—	80
52	0.75	0.75	1.49	1.72	0.80	1.39	0.77	1.71	0.80	1.18	1.36	127	—	76
521	0.20	—	0.55	0.76	—	0.82	0.31	0.89	0.33	0.89	0.51	51	—	51
53	1.20	0.91	6.27	2.41	3.38	2.77	3.22	2.38	1.95	2.94	3.66	203	49	154
54	3.64	3.52	6.05	4.06	4.51	3.17	3.11	3.33	3.06	5.73	3.98	816	—	45
541	3.38	3.49	5.67	3.27	4.27	3.05	2.56	3.18	2.75	4.98	3.47	571	138	433
55	3.82	3.39	5.73	4.61	2.50	4.35	3.83	4.16	4.66	4.59	4.69	645	—	17
551	1.86	1.16	1.95	2.95	0.79	1.61	1.99	1.93	2.00	2.38	2.07	315	181	134
553	0.41	0.60	1.15	0.36	0.34	0.57	0.51	0.60	0.75	—	0.43	69	12	57
554	1.44	1.32	2.43	1.13	1.26	1.90	1.08	0.85	1.71	1.57	1.81	244	100	144
562	0.56	0.33	1.07	0.22	0.43	0.36	0.69	—	0.38	—	0.57	95	41	54
57	0.72	—	—	—	—	—	0.99	—	0.67	1.68	1.34	121	—	39
571	0.49	—	0.73	0.71	0.57	0.81	0.61	0.66	0.44	1.34	0.70	82	—	8
5712	0.44	—	0.60	0.54	—	0.46	0.43	—	0.22	1.09	0.50	74	20	54
58	8.38	4.83	7.99	7.62	11.80	8.50	8.28	6.11	7.30	8.70	9.49	1,078	58	118
5812	4.52	3.70	8.72	6.25	8.95	7.51	5.78	4.66	5.54	7.08	6.98	764	139	625
5813	0.82	0.72	0.70	0.80	0.52	0.49	0.43	1.28	1.02	—	0.62	138	65	73
59	1.96	1.82	3.78	3.61	3.97	3.86	3.22	2.76	2.04	3.47	4.21	332	—	108
591	0.92	0.77	1.57	1.24	0.74	1.72	1.36	1.00	0.65	2.09	1.12	155	45	110
594	0.41	0.36	0.90	0.93	2.22	1.13	1.31	0.42	0.78	1.06	1.44	69	8	61
Finance, Insurance, and Real Estate	4.13	3.11	4.59	4.92	6.59	9.64	4.27	4.72	3.12	5.73	7.94	698	—	58
60	1.20	0.98	2.37	1.84	1.10	2.23	1.61	2.39	1.62	2.74	1.95	202	19	—
602	1.08	0.98	2.37	1.82	1.09	2.23	1.61	—	1.62	2.74	1.86	183	17	186
61	0.60	—	0.62	0.83	0.92	0.91	0.91	0.50	0.44	1.19	1.47	101	27	3
612	0.42	—	—	0.38	—	—	—	—	—	—	0.85	71	71	—
64	0.25	—	0.57	0.75	—	0.64	0.38	0.69	0.39	—	0.76	59	—	59
65	1.64	1.07	0.42	1.33	3.99	1.55	0.62	0.89	0.44	1.06	1.60	278	50	—
651	1.35	—	—	0.95	2.34	0.78	—	0.64	—	0.42	0.83	228	157	71
Services	16.08	8.83	15.57	28.40	29.84	17.26	33.63	14.51	15.89	18.71	25.73	2,718	—	67
70	1.77	2.03	1.83	1.59	15.92	1.57	2.40	0.76	1.07	—	2.82	299	171	128
72	1.05	0.72	1.49	1.88	1.74	2.20	1.17	1.22	1.14	1.45	1.49	177	33	57
723	0.51	0.38	0.49	1.05	0.62	0.54	0.40	0.63	0.57	0.74	0.83	87	23	64
73	1.02	0.64	1.08	2.64	1.44	1.06	—	1.26	2.20	1.37	2.20	173	12	44
739	0.69	0.50	0.61	0.81	0.60	0.38	—	—	1.03	0.78	0.78	117	53	64
75	0.47	—	1.07	0.79	2.02	0.61	1.06	—	0.83	0.76	0.88	79	—	11
753	0.40	—	0.87	0.63	0.63	0.54	0.78	—	0.56	0.59	0.77	68	—	68
79	0.86	—	1.09	1.09	1.29	0.84	0.52	0.85	0.82	2.56	—	145	25	25
799	0.56	—	0.57	—	0.85	0.39	—	0.45	0.52	—	0.37	95	32	83
80	6.61	1.61	4.15	12.20	2.34	5.42	—	4.19	6.78	4.86	9.74	1,117	490	203
801	0.60	0.41	1.89	1.82	1.05	1.20	0.93	1.52	1.10	1.51	1.49	101	32	69
805	1.91	—	—	—	—	—	—	1.78	—	—	1.89	323	323	—
81	0.37	—	0.67	0.47	0.33	0.56	0.48	0.46	0.33	—	0.71	63	7	56
83	0.58	0.89	0.85	0.58	1.57	—	0.69	1.11	0.68	0.62	1.30	98	—	—
831	0.58	—	—	0.52	1.57	—	—	—	—	0.62	1.12	98	10	88
86	2.60	1.06	1.16	0.73	1.36	1.90	0.99	1.18	0.92	1.78	2.92	440	23	17
863	0.46	—	—	0.40	—	0.51	—	0.54	0.25	—	0.59	78	36	42
864	1.91	0.41	0.51	—	—	0.63	0.52	0.38	—	0.42	0.89	322	258	64
89	0.25	—	0.83	0.55	1.44	1.30	1.11	1.46	0.46	0.72	1.31	60	—	60

Step E:5

PURPOSE:

Develop employment multipliers based on the "experience" technique.

DATA REQUIREMENTS:

Most recent County Business Patterns for the port's state; Canadian Census Vol. III, Part 4 Bulletins 3.4-5 and 3.4-6 for Canadian port users. There are no other specific data requirements for this step. However, local and regional planning agencies, economic development districts, state or community college economics departments, and similar sources should be contacted to locate any economic base studies which may have been done for the study area and to identify persons with extensive knowledge of the area's economic structure.

DISCUSSION:

As discussed in the previous two steps, the available indirect techniques for determining basic and non-basic employment may yield misleading results. This technique, admittedly much "softer" than the others, relies on the user's knowledge of the local economy. The assumption is that familiarity with local businesses and conditions is a better predictor of basic employment than any approach based on averages and aggregates. It should be mentioned here that the ideal economic base study would be a direct survey in which each local firm reported its local and export sales. If a port community has a recent study of this type available, no other techniques would be needed to derive economic base multipliers.

The advantage of this approach is that it focuses attention on the specific characteristics of the local economy which may not be apparent in either of the other approaches. Both the concentration and the minimum requirements calculations begin with the percent distribution of local employment reported in County Business Patterns (or the Canadian Census Bulletins). The problem with using this distribution is that it may be distorted by a single special circumstance. For example, large amounts of construction employment involved in building a power plant would drive down the share of employment in all other industries, causing an overestimate of non-basic employment by either of the other techniques.

RECOMMENDED ACTION:

The user begins with the detailed information on port county employment presented in County Business Patterns (or the Canadian Census Bulletins) and estimates the amount of employment in each industry that is basic. Sources which may be used for these estimates include:

- Existing economic base studies, particularly those based on surveys,
- Persons knowledgeable about the local economy such as planners or economists, who may either provide estimates or check the reasonableness of the user's estimates, and
- Optional questions added to the port and port-dependent industry surveys.

Estimates of basic employment are summed and divided into total employment to calculate multipliers for each major industry division.

USE OF RESULTS:

The employment assignments developed in this step will be used in the derivation of the income multiplier in Step E:7.

DEVELOPMENT OF SECONDARY IMPACT MULTIPLIERS

Step E:6

PURPOSE:

Derive a single "consensus" employment multiplier.

DATA REQUIREMENTS:

Results of Steps E:3, E:4, and E:5.

DISCUSSION:

Each of the three approaches described in the previous steps is likely to result in a different level of basic employment and thus a different employment multiplier. The concentration approach generally yields a higher multiplier (lower number of basic employees) than the minimum requirements approach. While it cannot be determined on an a priori basis whether the "experience" technique will yield a higher or lower multiplier, it is likely to be lower because the other two methods tend to bias the total multiplier upward.

In order to present a conservative estimate of port-related impacts, we recommend that the lowest multiplier be selected. In general the total employment multiplier (that is, the combined multiplier for all industries) should be between 2 and 3, and probably closer to 2 for most counties. For relatively small, undeveloped areas, the multiplier may be as low as 1.5.

RECOMMENDED ACTION:

From the employment distributions calculated in Steps E:3, E:4, and E:5, select the largest of the three numbers of basic employees in each SIC category reported in County Business Patterns (or Canadian Census Bulletins 3.4-5 and 3.4-6) for the port county. These will form the basis of the consensus multiplier. Basic employment in each industry is summed and divided into total employment to calculate the total multiplier and the multiplier for each major industry division.

USE OF RESULTS:

These consensus employment assignments will be used to calculate the income multiplier in Step E:7.

DEVELOPMENT OF SECONDARY IMPACT MULTIPLIERS

Step E:7

PURPOSE:

Develop economic base income multiplier.

DATA REQUIREMENTS:

Bureau of Economic Analysis personal income data for port county or SMSA (see Step E:2) and results of Step E:6; Employment, Earnings and Hours for Canadian ports.

DISCUSSION:

Income is generally a better measure of downstream economic impacts than employment. Moreover, the employment multiplier excludes the effects of non-labor income (interest, dividends, and transfer payments) which is primarily basic and supports non-basic employment. (Transfer payments alone currently account for close to 15% of total personal income nationwide.) Using an income multiplier to capture this additional component of the basic sector is therefore a more theoretically justifiable approach. The reason that the income multiplier is not computed initially is that the available data are too highly aggregated to use the indirect techniques for determining distributions between the basic and non-basic sectors.

Large Canadian ports will be able to utilize this technique, but only with wage income being included. Small ports, or more correctly ports from less developed areas, will not be able to use this step unless disaggregated income and employment by industry can be obtained for the area.

RECOMMENDED ACTION:

The first element of this step is to determine the percentage of basic and non-basic employment in each major industry division for which income data are reported. Major industry divisions and corresponding two-digit SICs are:

Agriculture, forestry, and fisheries	01-09
Mining	10-14
Contract construction	15-17
Manufacturing	19-39
Transportation, communication, and public utilities	40-49
Wholesale and retail trade	50-59
Finance, insurance, and real estate	60-67
Services	70-89

The consensus allocation of employment to the basic and non-basic sectors (Step E:6) should be aggregated to correspond to these industry divisions and the percent in each sector determined. Exhibit E:7-1 is an example of the BEA income data available for each county. The income multiplier is calculated by determining the basic and non-basic components of personal income by place of residence.

First, labor and proprietors' income by place of work is divided according to the employment data. Income for each major industry division is split into basic and non-basic components according to the percentage of employment in each sector. Since farm and government employment are not covered in the County Business Patterns data, income for these industries is treated separately. Farm activity (and income) tends to be basic; it is reasonable to assume that at least 70% of total farm income is related to export demand. A brief discussion with the County Extension Service would provide an idea of product destinations which can be used as a basis for the allocation. Federal Government civilian and military income is generally considered completely basic, although a small portion of federal income related to such things as the postal service could be considered non-basic. Most state government income is also considered basic. Local government employment is usually considered non-basic, but it could reasonably be argued that those jobs supported by federal revenue sharing, CETA, or similar programs are basic. Therefore, state and local government income can be split equally between the basic and non-basic sectors. The sum of basic and non-basic income for all industries is labor and proprietors' income by place of work.

The remaining elements of the personal income by place of residence calculation are divided according to the assumptions below. Personal contributions for social insurance are divided in the same proportion as labor and proprietors' income. The residence adjustment, which accounts for people who live and work in different counties, is treated the same way. Dividends, interest, and rent are derived from both local and non-local sources, and should be considered 50% basic and 50% non-basic. Transfer payments represent monies paid to individuals by federal and state government (social security, welfare, etc.) and thus should be considered basic. The sum of these four components plus labor and proprietors' income is total personal income by place of residence. The income multiplier is calculated by dividing total income by basic income. An example of the entire process is shown in Exhibit E:7-2.

For Canadian ports the weekly earnings data from Employment Earnings and Hours should be multiplied by the appropriate number of employees in each industry category. The resulting total wage and salary income should then be expanded to account for firms not covered by the larger firm survey that forms the basis of Employment, Earnings, and Hours. The expansion is accomplished by dividing the total income for each sector by the survey coverage percentages provided in the "Concepts and Methods" section of Employment, Earnings, and Hours. The results of this expansion should then be allocated between the basic and non-basic sectors according to the employment assignments (Step E:6). The income multiplier is then estimated by dividing total earnings (basic plus non-basic) by basic earnings. The resultant multiplier will be somewhat higher than if these other income sources were included since they would add to the basic income share. The foreign export adjustment detailed in Step E:3 will have to be utilized if a consistent income multiplier is to be obtained.

USE OF RESULTS:

The income multiplier is used to estimate the total impact of direct port activities.

EXHIBIT E:7-1

EXAMPLE OF BEA COUNTY INCOME DATA

PERSONAL INCOME BY MAJOR SOURCES 1971-76 (THOUSANDS OF DOLLARS)

GRAYS HARBOR	WASHINGTON	1971 1/	1972 1/	1973 1/	1974 1/	1975 2/	1976 2/
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK 3/							
BY TYPE							
WAGE AND SALARY DISBURSEMENTS		145,514	162,499	182,030	194,934	199,215	242,481
OTHER LABOR INCOME		6,288	7,945	9,313	10,806	12,122	15,223
PROPRIETORS INCOME 4/		21,936	25,362	31,929	33,709	33,388	36,162
FARM		3,503	4,563	9,343	9,575	7,069	7,117
NON-FARM 4/		18,433	20,799	22,586	24,134	26,319	29,045
BY INDUSTRY							
FARM		4,377	5,432	9,911	10,257	7,886	8,151
NON-FARM		169,361	157,067	213,361	229,192	236,839	292,115
PRIVATE		141,727	140,156	180,178	193,537	196,133	245,018
AG. SERV., FOR., FISH., AND OTHER 5/		2,313	2,770	3,750	4,551	4,327	4,571
MINING	(L)	(L)	(L)	(L)	151	199	90
CONSTRUCTION		12,519	11,070	12,765	15,355	13,958	18,500
MANUFACTURING		66,021	75,492	88,083	91,676	90,389	121,321
NON-DURABLE GOODS		17,523	20,550	20,591	23,403	21,636	30,039
DURABLE GOODS		48,498	54,942	67,492	68,273	68,751	91,282
TRANSPORTATION AND PUBLIC UTILITIES		9,328	11,601	12,871	13,252	13,466	17,278
WHOLESALE TRADE		5,130	5,435	6,318	8,072	8,152	9,153
RETAIL TRADE		21,232	23,161	25,855	28,109	29,429	33,433
FINANCE, INSURANCE, AND REAL ESTATE		4,229	4,506	4,770	4,893	5,020	5,572
SERVICES		20,528	22,072	25,721	27,758	31,143	34,100
GOVERNMENT AND GOVERNMENT ENTERPRISES		27,634	30,218	33,183	35,255	40,706	47,097
FEDERAL, CIVILIAN		3,466	3,562	4,031	4,478	5,455	6,046
FEDERAL, MILITARY		1,885	2,101	2,570	2,276	2,326	2,653
STATE AND LOCAL		22,283	24,555	26,582	28,501	32,925	38,398
DERIVATION OF PERSONAL INCOME BY PLACE OF RESIDENCE							
TOTAL LABOR AND PROPRIETORS INCOME BY PLACE OF WORK		173,738	195,406	223,272	239,449	244,725	300,266
LESS: PERSONAL CONTRIBUTIONS FOR SOCIAL INSURANCE BY PLACE OF WORK		8,171	9,473	12,320	14,740	15,164	18,131
NET LABOR AND PROPRIETORS INCOME BY PLACE OF WORK		165,567	185,933	210,952	224,709	229,561	282,135
PLUS: RESIDENCE ADJUSTMENT		-1,325	-1,604	-1,912	-1,549	-1,322	-2,634
NET LABOR AND PROPRIETORS INCOME BY PLACE OF RESIDENCE		164,242	184,329	209,040	223,160	228,239	279,501
PLUS: DIVIDENDS, INTEREST, AND RENT 7/		30,587	34,057	38,497	44,422	46,468	51,800
PLUS: TRANSFER PAYMENTS		33,737	36,255	40,504	49,554	61,134	62,468
PERSONAL INCOME BY PLACE OF RESIDENCE		228,566	254,641	288,041	317,136	335,841	393,769
PER CAPITA PERSONAL INCOME (DOLLARS)		3,853	4,272	4,835	5,219	5,455	6,427
TOTAL POPULATION (THOUSANDS)		59.4	59.7	59.7	60.8	61.1	61.3

SEE FOOTNOTES AT END OF TABLES.

EXHIBIT E:7-2

CALCULATION OF INCOME MULTIPLIER
(in thousands of dollars)

	Percent		Total	Income	
	Basic	Non-basic		Basic	Non-basic
Labor and Proprietors' Income by Place of Work					
Farm	65%	35%	\$300,266	\$196,291	\$103,975
Manufacturing	75	25	8,151	6,113	2,038
Mining	92	8	121,321	111,615	9,706
Contract Construction	95	5	90	86	4
Wholesale and Retail Trade	20	80	18,900	3,780	15,120
Finance, Insurance, and Real Estate	28	72	42,586	11,924	30,662
Transportation, Communication, and Utilities	49	51	5,572	2,730	2,842
Services	56	44	17,278	9,676	7,602
Other	56	44	34,700	19,432	15,268
Federal - Civilian	66	34	4,571	3,017	1,554
Federal - Military	100	-	6,046	6,046	-
State and Local Government	100	-	2,693	2,693	-
Contributions for Social Insurance	50	50	38,358	19,179	19,179
Residence Adjustment	65	35	(18,131)	(11,785)	(6,346)
Dividends, Interest, and Rent	65	35	(2,634)	(1,712)	(922)
Transfer Payments	50	50	51,800	25,900	25,900
	100	-	62,468	62,468	-
Total Personal Income			\$393,769	\$271,162	\$122,607
Income Multiplier				1.45	

DEVELOP SECONDARY IMPACT MULTIPLIERS

Step E:8

PURPOSE:

Select industries whose multipliers will be derived by RIMS and instructions for ordering RIMS data.

DATA REQUIREMENTS:

RIMS industry classification chart (Exhibit E:8-1); original list of waterborne commerce related firms including the relevant SIC codes for each firm. Canadian ports have nothing completely comparable to RIMS so their alternatives are to obtain local or regional input/output studies (e.g., for Vancouver, British Columbia -- An Interindustry Study of the Metropolitan Vancouver Economy by H. Craig Davis, School of Commerce and Regional Planning, University of British Columbia, 1972) or, in the case of large ports in the principal metropolitan area of a province, to use the interprovincial input/output model of Statistics Canada.

DISCUSSION:

If the RIMS methodology is adopted it is important that the multipliers be ordered in advance since a six-week turnaround time should be expected. The cost was approximately \$1,000 as of April 1979. Specific local or regional Canadian input/output studies can be located, if they exist, by contacting local community planning boards, the local office of the Ministry of Economic Development, and/or local college or university economics departments. The interprovincial input/output model and a discussion of its use can be obtained from the structural Analysis Division of Statistics Canada in Ottawa.

RECOMMENDED ACTION:

The waterborne commerce related industries located in the region under study should be associated with RIMS industry classifications (Exhibit E:8-1) to determine the industry-specific multipliers that are needed. The \$1,000 purchase price allows for the derivation of 50 multipliers at no additional charge. A sample listing of waterborne commerce related industries with attached RIMS code is included as Exhibit E:8-2.

Further information concerning the RIMS methodology can be obtained by contacting Joseph Cartwright (202-523-0594). To write for RIMS information or to order a series of multipliers for a particular region send to:

Joseph Cartwright
BE - 61
Bureau of Economic Analysis
Department of Commerce
Washington, D.C. 20230

Requirements for a special set of multipliers to be formulated include:

1. A check or money order for \$1,000.
2. A list of the counties to be included in the region; the counties must be contiguous.
3. A list of the industries for which multipliers are to be determined.

USE OF RESULTS:

The RIMS multipliers will be used in Steps F:3, F:4, and F:5 to determine secondary and total impacts of waterborne commerce activity. The impact measures will include gross output, income, and employment.

EXHIBIT E:8-1

RIMS Industry Classifications

Industry number and title		Related SIC or Census codes	Industry number and title		Related SIC or Census codes
<u>Agriculture, forestry and fisheries</u>					
0101	Dairy farm products -----	0132, pt. 014, pt. 02	0602	Nonferrous metal ores mining, except copper -----	103, 104, 105, 108, 109
0102	Poultry & eggs -----	0133, pt. 014, pt. 02	0700	Coal mining -----	11, 12
0103	Meat, animals & misc. livestock products -----	0139, pt. 014, 0193, pt. 0729, pt. 02	0800	Crude petroleum & natural gas ---	1311, 1321
		0112, pt. 014, pt. 02	0900	Stone & clay mining & quarrying -	141, 142, 144, 145, 148, 149
0201	Cotton -----	0113, pt. 0119, pt. 014, pt. 02	1000	Chemical & fertilizer mineral mining -----	147
0202	Food feed grains & grass seeds -----	0123, pt. 0119, pt. 014, pt. 02	<u>Construction</u>		
0203	Tobacco -----	pt, 0119, pt. 014, pt. 02	1503	New residential single family housing, nonfarm -----	pt. 15, pt. 17, pt. 6561
0204	Fruits & tree nuts -----	0122, pt. 014, pt. 02	1504	New residential two-four family housing -----	pt. 15, pt. 17, pt. 6561
0205	Vegetables, sugar & misc. crops ----	0123, pt. 0119, pt. 014, pt. 02	1505	New residential garden apartments -----	pt. 15, pt. 16, pt. 17
0206	Oil bearing crops -----	pt. 0119, pt. 014, pt. 02	1506	New residential high-rise apartments -----	pt. 15, pt. 16, pt. 17
0207	Forest, greenhouse & nursery products -----	0192, pt. 014, pt. 02	1507	New residential alterations & additions -----	pt. 15, pt. 17
0300	Forestry & fishery products -----	074, 081, 082, 084, 086, 091	1508	New hotels & motels -----	pt. 15, pt. 17
0400	Agricultural, forestry & fishery services -----	071, 0723, 073, pt. 0729, 085, 098	1509	New dormitories -----	pt. 15, pt. 17
			1511	New industrial buildings -----	pt. 15, pt. 17
			1512	New office buildings -----	pt. 15, pt. 17
			1513	New warehouses -----	pt. 15, pt. 17
			1514	New garages & service stations --	pt. 15, pt. 17
			1515	New stores & restaurants -----	pt. 15, pt. 17
			1516	New religious buildings -----	pt. 15, pt. 17
			1517	New education buildings -----	pt. 15, pt. 17
			1518	New hospital buildings -----	pt. 15, pt. 17
			1519	New other nonfarm buildings -----	pt. 15, pt. 17
<u>Mining</u>					
0500	Iron & ferroalloy ores mining -----	1011, 106			
0601	Copper ore mining -----	102			

EXHIBIT E:8-1
RIMS Industry Classifications

Industry number and title	RELATED SIC or Census codes	Industry number and title	Related SIC or Census codes
1601 New telephone & telegraph facilities	pt. 16, pt. 17	1729 Maintenance & repair of water supply facilities	pt. 16, pt. 17
1602 New railroads	pt. 16, pt. 17	1731 Maintenance & repair of sewer facilities	pt. 16, pt. 17
1603 New electric utility facilities	pt. 16, pt. 17	1732 Maintenance & repair of local transit facilities	pt. 16, pt. 17
1604 New gas utility facilities	pt. 16, pt. 17	1733 Maintenance & repair of military facilities	pt. 15, pt. 16, pt. 17
1605 New petroleum pipelines	pt. 16, pt. 17	1734 Maintenance & repair of conservation & development facilities	pt. 15, pt. 16, pt. 17
1606 New water supply facilities	pt. 16, pt. 17	1735 Maintenance & repair of highways	pt. 16, pt. 17
1607 New sewer facilities	pt. 16, pt. 17	1736 Maintenance & repair of oil & gas wells	pt. 138
1608 New local transit facilities	pt. 16, pt. 17	1737 Maintenance & repair of other nonbuilding facilities	pt. 15, pt. 16, pt. 17
1610 New highways	pt. 16, pt. 17		
1621 New farm residential buildings	pt. 15, pt. 17	<u>Manufacturing</u>	
1622 New farm service facilities	pt. 15, pt. 17	1419 Sugar	206
1623 New oil & gas wells	pt. 138	1701 Floor coverings	227
1624 New oil & gas exploration	pt. 138	1804 Apparel made from purchased materials	23 (exc 239), 3992
1625 New military facilities	pt. 15, pt. 16, pt. 17	1925 Complete guided missiles	1925
		1929 Ammunition, exc. for small arms, n.e.c.	1929
1626 New conservation & development facilities	pt. 15, pt. 16, pt. 17	1931 Tanks & tank components	1931
		1941 Sighting & fire control equip.	1941
1627 Other new nonbuilding facilities	pt. 15, pt. 16, pt. 17	1951 Small arms	1951
1710 Maintenance & repair, residential	pt. 15, pt. 17	1961 Small arms ammunition	1961
1721 Maintenance & repair of other nonfarm buildings	pt. 15, pt. 17	1990 Other ordnance & accessories	1911, 1999
1722 Maintenance & repair of farm residential	pt. 15, pt. 17	2011 Meat packing plants	2011
1723 Maintenance & repair of farm service facilities	pt. 15, pt. 17	2013 Sausages & other prepared meats	2013
1724 Maintenance & repair of telephone & telegraph facilities	pt. 16, pt. 17	2015 Poultry dressing plants	2015
1725 Maintenance & repair of railroads	pt. 16, pt. 17	2021 Creamery butter	2021
1726 Maintenance & repair of electric utility facilities	pt. 16, pt. 17	2022 Cheese, natural & processed	2022
1727 Maintenance & repair of gas utility facilities	pt. 16, pt. 17	2023 Condensed & evaporated milk	2023
1728 Maintenance & repair of petroleum pipelines	pt. 16, pt. 17	2024 Ice cream & frozen desserts	2024

EXHIBIT E:8-1

RIMS Industry Classifications

Industry number and title		Related SIC or Census codes	Industry number and title		Related SIC or Census codes
2026	Fluid milk -----	2026	2121	Cigars -----	2121
2031	Canned & cured sea foods -----	2031	2131	Chewing & smoking tobacco -----	2131
2032	Canned specialties -----	2032	2141	Tobacco stemming & redrying -----	2141
2033	Canned fruits & vegetables -----	2033	2201	Broadwoven fabric mills & fabric finishing plants -----	2211, 2221, 2231, 2261, 2262
2034	Dehydrated food products -----	2034			
2035	Pickles, sauces, & salad dressings --	2035			
2036	Fresh or frozen packaged fish -----	2036	2241	Narrow fabric mills -----	2241
2037	Frozen fruits & vegetables -----	2037	2251	Women's hosiery, except socks ---	2251
2041	Flour & other grain mill products ---	2041	2252	Hosiery, n.e.c. -----	2252
2042	Prepared feeds for animals & fowl ---	2042	2253	Knit outerwear mills -----	2253
2043	Cereal preparations -----	2043	2254	Knit underwear mills -----	2254
2044	Rice milling -----	2044	2256	Knit fabric mills -----	2256
2045	Blended & prepared flour -----	2045	2259	Knitting mills, n.e.c. -----	2259
2046	Wet corn milling -----	2046	2280	Yarn mills & finishing of textiles, n.e.c. -----	2269, 2281-3
2051	Bread, cake & related products -----	2051	2284	Thread mills -----	2284
2052	Cookies & crackers -----	2052	2291	Felt goods, n.e.c. -----	2291
2071	Confectionery products -----	2071	2292	Lace goods -----	2292
2072	Chocolate & cocoa products -----	2072	2293	Paddings & upholstery filling ---	2293
2073	Chewing gum -----	2073	2294	Processed textile waste -----	2294
2082	Malt liquors -----	2082	2295	Coated fabrics, not rubberized --	2295
2083	Malt -----	2083	2296	Tire cord & fabric -----	2296
2084	Wines, brandy, & brandy spirits -----	2084	2297	Scouring & combing plants -----	2297
2085	Distilled liquor, except brandy -----	2085	2298	Cordage & twine -----	2298
2086	Bottled & canned soft drinks -----	2086	2299	Textile goods, n.e.c. -----	2299
2087	Flavoring extracts & syrups, n.e.c. --	2087	2391	Curtains & draperies -----	2391
2091	Cottonseed oil mills -----	2091	2392	Housefurnishings, n.e.c. -----	2392
2092	Soybean oil mills -----	2092	2393	Textile bags -----	2393
2093	Vegetable oil mills, n.e.c. -----	2093	2394	Canvas products -----	2394
2094	Animal & marine fats & oils -----	2094	2395	Pleating & stitching -----	2395
2095	Roasted coffee -----	2095	2396	Automotive & apparel trimmings --	2396
2096	Shortening & cooking oils -----	2096	2397	Schiffli machine embroideries ---	2397
2097	Manufactured ice -----	2097	2399	Fabricated textile products, n.e.c. -----	2399
2098	Macaroni & spaghetti -----	2098			
2099	Food preparations, n.e.c. -----	2099	2411	Logging camps, & logging contractors -----	2411
2100	Wooden containers -----	244			
2111	Cigarettes -----	2111			

EXHIBIT E:8-1
RIMS Industry Classifications

Industry number and title	Related SIC or Census codes	Industry number and title	Related SIC or Census codes
2421 Sawmills & planing mills, general ---	2421	2711 Newspapers -----	2711
2426 Hardwood dimension & flooring -----	2426	2721 Periodicals -----	2721
2429 Special product sawmills, n.e.c. ----	2429	2731 Book publishing -----	2731
2431 Millwork -----	2431	2732 Book printing -----	2732
2432 Veneer & plywood -----	2432	2741 Miscellaneous publishing -----	2741
2433 Prefabricated wood structures -----	2433	2753 Engraving & plate printing -----	2753
2491 Wood preserving -----	2491	2761 Manifold business forms -----	2761
2499 Wood products, n.e.c. -----	2499	2771 Greeting card publishing -----	2771
2500 Paperboard containers & boxes -----	265	2782 Blankbooks & looseleaf binders --	2782
2511 Wood household furniture -----	2511	2789 Bookbinding & related work -----	2789
2512 Upholstered household furniture -----	2512	2791 Typesetting -----	2791
2514 Metal household furniture -----	2514	2793 Photoengraving -----	2793
2515 Mattresses & bedsprings -----	2515	2794 Electrotyping & stereotyping -----	2794
2519 Household furniture, n.e.c. -----	2519	2821 Plastics materials & resins -----	2821
2521 Wood office furniture -----	2521	2822 Synthetic rubber -----	2822
2522 Metal office furniture -----	2522	2823 Cellulosic man-made fibers -----	2823
2531 Public building furniture -----	2531	2824 Organic fibers, noncellulosic ----	2824
2541 Wood partitions & fixtures -----	2541	2841 Soap & other detergents -----	2841
2542 Metal partitions & fixtures -----	2542	2842 Polishes & sanitation goods -----	2842
2591 Venetian blinds & shades -----	2591	2843 Surface active agents -----	2843
2599 Furniture & fixtures, n.e.c. -----	2599	2844 Toilet preparations -----	2844
2605 Commercial printing -----	2751, 2752	2851 Paints & allied products -----	2851
2611 Pulp mills -----	2611	2861 Gum & wood chemicals -----	2861
2621 Paper mills, except building paper --	2621	2871 Fertilizers -----	2871
2631 Paperboard mills -----	2631	2872 Fertilizers, mixing only -----	2872
2641 Paper coating & glazing -----	2641	2879 Agricultural chemicals, n.e.c. --	2879
2642 Envelopes -----	2642	2891 Adhesives & gelatin -----	2891
2643 Bags, except textile bags -----	2643	2892 Explosives -----	2892
2644 Wallpaper -----	2644	2893 Printing Ink -----	2893
2645 Die cut paper & board -----	2645	2895 Carbon black -----	2895
2646 Pressed & molded pulp goods -----	2646	2899 Chemical preparations, n.e.c. ----	2899
2647 Sanitary paper products -----	2647	2901 Drugs -----	283
2649 Converted paper products, n.e.c. ----	2649	2951 Paving mixtures & blocks -----	2951
2661 Building paper & board mills -----	2661	2952 Asphalt felts & coatings -----	2952
2701 Industrial inorganic & organic chemicals -----	281 exc. 28195	3011 Tires & inner tubes -----	3011
		3021 Rubber footwear -----	3021

EXHIBIT E:8-1
RIMS Industry Classifications

RIMS Industry Classifications		Related SIC or Census codes	
Industry number and title	Related SIC or Census codes	Industry number and title	Related SIC or Census codes
3031 Reclaimed rubber -----	3031	3297 Nonclay refractories -----	3297
3069 Fabricated rubber products, n.e.c. ---	3069	3299 Nonmetallic mineral products. n.e.c. -----	3299
3079 Miscellaneous plastics products -----	3079	3312 Blast furnaces & steel mills -----	3312
3101 Petroleum refining & related products 2911, 299	2911, 299	3313 Electrometallurgical products -----	3313
3111 Leather tanning & finishing -----	3111	3315 Steel wire & related products -----	3315
3121 Industrial leather belting -----	3121	3316 Cold finishing of steel shapes --	3316
3131 Footwear cut stock -----	3131	3317 Steel pipe & tubes -----	3317
3141 Shoes, except rubber -----	3141	3331 Primary copper -----	3331
3142 House slippers -----	3142	3332 Primary lead -----	3332
3151 Leather gloves & mittens -----	3151	3333 Primary zinc -----	3333
3161 Luggage -----	3161	3334 Primary aluminum -----	3334, 28195
3171 Women's handbags & purses -----	3171	3339 Primary nonferrous metals, n.e.c. --	3339
3172 Personal leather goods -----	3172	3341 Secondary nonferrous metals -----	3341
3199 Leather goods, n.e.c. -----	3199	3351 Copper rolling & drawing -----	3351
3221 Glass containers -----	3221	3352 Aluminum rolling & drawing -----	3352
3241 Cement, hydraulic -----	3241	3356 Nonferrous rolling & drawing, n.e.c. -----	3356
3251 Brick & structural clay tile -----	3251	3357. Nonferrous wire drawing & insulating -----	3357
3253 Ceramic wall & floor tile -----	3253	3361 Aluminum castings -----	3361
3255 Clay refractories -----	3255	3362 Brass, bronze, & copper castings--	3362
3259 Structural clay products, n.e.c. ---	3259	3369 Nonferrous castings, n.e.c. -----	3369
3261 Vitreous plumbing fixtures -----	3261	3391 Iron & steel forgings -----	3391
3262 Vitreous china food utensils -----	3262	3392 Nonferrous forgings -----	3392
3263 Fine earthenware food utensils -----	3263	3399 Primary metal products, n.e.c. --	3399
3264 Porcelain electrical supplies -----	3264	3411 Metal cans -----	3411
3269 Pottery products, n.e.c. -----	3269	3421 Cutlery -----	3421
3271 Concrete block & brick -----	3271	3423 Hand & edge tools, n.e.c. -----	3423
3272 Concrete products, n.e.c. -----	3272	3425 Hand saws & saw blades -----	3425
3273 Ready-mixed concrete -----	3273	3429 Hardware, n.e.c. -----	3429
3274 Lime -----	3274	3431 Metal sanitary ware -----	3431
3275 Gypsum products -----	3275	3432 Plumbing fittings & brass goods -	3432
3281 Cut stone & stone products -----	3281	3433 Heating equipment, except electric -----	3433
3291 Abrasive products -----	3291	3441 Fabricated structural steel -----	3441
3292 Asbestos products -----	3292		
3293 Gaskets & insulations -----	3293		
3295 Minerals, ground or treated -----	3295		
3296 Mineral wool -----	3296		

EXHIBIT E:8-1
RIMS Industry Classifications

Industry number and title	Related SIC or Census codes	Industry number and title	Related SIC or Census codes
3442 Metal doors, sash, & trim -----	3442	3559 Special industry machine, n.e.c. -	3559
3443 Fabricated plate work (boiler shops) -	3443	3561 Pumps & compressors -----	3561
3444 Sheet metal work -----	3444	3562 Ball & roller bearings -----	3562
3446 Architectural metal work -----	3446	3564 Blowers & fans -----	3564
3449 Miscellaneous metal work -----	3449	3565 Industrial patterns -----	3565
3461 Metal stampings -----	3461	3566 Power transmission equipment -----	3566
3471 Plating & polishing -----	3471	3567 Industrial furnaces & ovens -----	3567
3479 Metal coating & allied services -----	3479	3569 General industrial machinery, n.e.c. -----	3569
3481 Miscellaneous fabricated wire products -----	3481	3571 Computing & related machines -----	3571
3491 Metal barrels, drums, & pails -----	3491	3572 Typewriters -----	3572
3492 Safes & vaults -----	3492	3576 Scales & balances -----	3576
3493 Steel springs -----	3493	3579 Office machines, n.e.c. -----	3579
3496 Collapsible tubes -----	3496	3581 Automatic merchandising machines -	3581
3497 Metal foil & leaf -----	3497	3582 Commercial laundry equipment -----	3582
3499 Fabricated metal products, n.e.c. -----	3499	3585 Refrigeration machinery -----	3585
3501 Glass & glass products exc. containers -----	3501	3586 Measuring & dispensing pumps -----	3586
3511 Steam engines & turbines -----	3511, 3229, 3231	3589 Service industry machines, n.e.c. -	3589
3519 Internal combustion engines, n.e.c. --	3519	3599 Miscellaneous machinery, except n.e.c. -----	3599
3522 Farm machinery -----	3522	3611 Electric measuring instruments --	3611
3531 Construction machinery -----	3531	3612 Transformers -----	3612
3532 Mining machinery -----	3532	3613 Switchgear & switchboard -----	3613
3533 Oil field machinery -----	3533	3621 Motors & generators -----	3621
3534 Elevators & moving stairways -----	3534	3622 Industrial controls -----	3622
3535 Conveyors & conveying equipment -----	3535	3623 Welding apparatus -----	3623
3536 Hoists, cranes, & monorails -----	3536	3624 Carbon & graphite products -----	3624
3537 Industrial trucks & tractors -----	3537	3629 Electrical industrial apparatus, n.e.c. -----	3629
3541 Machine tools, metal cutting types --	3541	3631 Household cooking equipment -----	3631
3542 Machine tools, metal forming types --	3542	3632 Household refrigerators & freezers -----	3632
3548 Metalworking machinery, n.e.c. -----	3548	3633 Household laundry equipment -----	3633
3551 Food products machinery -----	3551	3634 Electric housewares & fans -----	3634
3552 Textile machinery -----	3552	3635 Household vacuum cleaners -----	3635
3553 Woodworking machinery -----	3553	3636 Sewing machines -----	3636
3554 Paper industries machinery -----	3554		
3555 Printing trades machinery -----	3555		

EXHIBIT E:8-1
RIMS Industry Classifications

Industry number and title	Related SIC or Census codes	Industry number and title	Related SIC or Census codes
3639 Household appliances, n.e.c. -----	3639	3851 Ophthalmic goods -----	3851
3641 Electric lamps -----	3641	3861 Photographic equipment & supplies -----	3861
3642 Lighting fixtures -----	3642	3871 Watches & clocks -----	3871
3651 Radio & TV receiving sets -----	3651	3872 Watchcases -----	3872
3652 Phonograph records -----	3652	3911 Jewelry, precious metal -----	3911
3661 Telephone & telegraph apparatus -----	3661	3912 Jewelers' findings & materials -----	3912
3662 Radio & TV communication equipment --	3662	3913 Lapidary work -----	3913
3674 Semiconductors -----	3674	3914 Silverware & plated ware -----	3914
3679 Electronic components, n.e.c. -----	3679	3931 Musical instruments & parts -----	3931
3691 Storage batteries -----	3691	3941 Games & toys -----	3941
3692 Primary batteries, dry & wet -----	3692	3942 Dolls -----	3942
3693 X-ray apparatus & tubes -----	3693	3943 Children's vehicles, except bicycles -----	3943
3694 Engine electrical equipment -----	3694	3949 Sporting & athletic goods, n.e.c. -----	3949
3699 Electrical equipment, n.e.c. -----	3699	3951 Pens & mechanical pencils -----	3951
3702 Iron & steel foundries -----	332	3952 Lead pencils & art goods -----	3952
3713 Truck & bus bodies -----	3713	3953 Marking devices -----	3953
3715 Truck trailers -----	3715	3955 Carbon paper & inked ribbons -----	3955
3717 Motor vehicles & parts -----	3717	3961 Costume jewelry -----	3961
3721 Aircraft -----	3721	3962 Artificial flowers -----	3962
3722 Aircraft engines & engine parts -----	3722	3963 Buttons -----	3963
3723 Aircraft propellers & parts -----	3723	3964 Needles, pins, & fasteners -----	3964
3729 Aircraft equipment, n.e.c. -----	3729	3981 Brooms & brushes -----	3981
3731 Shipbuilding & repairing -----	3731	3982 Hard surface floor covering -----	3982
3732 Boatbuilding & repairing -----	3732	3983 Matches -----	3983
3741 Locomotives & parts -----	3741	3984 Candles -----	3984
3742 Railroad & street cars -----	3742	3987 Lamp shades -----	3987
3751 Motorcycles, bicycles, & parts -----	3751	3988 Morticians goods -----	3988
3791 Trailer coaches -----	3791	3993 Signs & advertising display -----	3993
3799 Transportation equipment, n.e.c. -----	3799	3995 Umbrellas, parasols & canes -----	3995
3811 Engineering & scientific instruments-	3811	3999 Miscellaneous products, n.e.c. --	3999
3821 Mechanical measuring devices -----	3821	4101 Screw machine products & bolts, nuts, rivets & washers -----	345
3822 Automatic temperature controls -----	3822	4208 Pipe, valves & pipe fittings -----	3494, 3498
3831 Optical instruments & lenses -----	3831	4703 Special dies & tools & machine tool accessories -----	3544, 3545
3841 Surgical & medical instruments -----	3841		
3842 Surgical appliances & supplies -----	3842		
3843 Dental equipment & supplies -----	3843		

EXHIBIT E:8-1
RIMS Industry Classifications

Industry number and title	Related SIC or Census codes	Industry number and title	Related SIC or Census codes
5503 Wiring devices -----	3643, 3644	7004 Insurance carriers -----	63
5701 Electron tubes -----	3671, 3672, 3673	7005 Insurance agents & brokers -----	64
<u>Transportation, communication, electric, gas & sanitary services</u>		7101 Owner-occupied dwellings -----	NA
		7102 Real estate -----	65 (except pt. 6561), 66
		<u>Services</u>	
6501 Railroads & related services -----	40, 474	7201 Hotels & lodging places -----	70
6502 Local, suburban & interurban highway passenger transportation ---	41	7202 Personal & repair services, except auto repair, barber, & beauty shops -----	72 (except 723,724), 76 (except 7694 & pt. 7699) 723, 724
6503 Motor freight transportation & warehousing -----	42, 473	7203 Barber & beauty shops -----	73 (except 731,7396) 7694, pt. 7699
6504 Water transportation -----	44	7301 Miscellaneous business services -	731
6505 Air transportation -----	45	7302 Advertising -----	81, 89 (except 8921)
6506 Pipe line transportation -----	46	7303 Miscellaneous professional services -----	81, 89 (except 8921) 81, 89 (except 8921)
6507 Transportation services -----	47, except 473,474	7500 Automobile repair & services -----	75
6600 Communications, except radio & television -----	48, except 483	7601 Motion pictures -----	78
6700 Radio & television broadcasting -----	483	7602 Amusement & recreation services -	79
6801 Electric utilities -----	491, pt. 493	7701 Doctors & dentists -----	801, 802, 803, 804
6802 Gas utilities -----	492, pt. 493	7702 Hospitals -----	8061
6803 Water & sanitary services -----	494, 495, 496, 497, pt. 493	7703 Other medical & health services -	0722, 807, 809
<u>Wholesale & retail trade</u>		7704 Educational services -----	82
6901 Wholesale trade -----	50 (except manu- facturers' sales offices)	7705 Nonprofit organizations -----	84, 86, 8921
6902 Retail trade -----	52, 53, 54, 55,56, 57,58,59, 7396		
<u>Finance, insurance & real estate</u>			
7001 Banking -----	60		
7002 Credit agencies -----	61, 67		
7003 Security & commodity brokers -----	62		

EXHIBIT E:8-2

WATERBORNE COMMERCE RELATED
INDUSTRIES WITH RIMS CODES

0300	Forestry and fishery products
1513	New warehouses
1721	Maintenance and repair of other non-farm buildings
1519	New other non-farm buildings
1627	Other new non-building facilities
1737	Maintenance and repair of other non-building facilities
3731	Shipbuilding and repairing
3732	Boatbuilding and repairing
6501	Railroads and related services
6503	Motorfreight transportation and warehousing
6504	Water transportation
6507	Transportation services
6506	Pipeline transportation
6901	Wholesale trade
6902	Retail trade
7001	Banking
7002	Credit agencies
7004	Insurance carriers
7005	Insurance agents and brokers
7102	Real estate
7301	Miscellaneous business services
7303	Miscellaneous professional services

CALCULATION OF SECONDARY IMPACTS

Step F:1

PURPOSE:

Determine the share of direct income that can be considered basic.

DATA REQUIREMENTS:

None.

DISCUSSION:

Simply, total income related to the port industry is the product of port industry basic income and the income multiplier derived in Step E:7. The problem is that some of the income from port activities can be considered basic and some non-basic. The port industry may serve both export and import (local) markets equally.

In general, income earned from outbound cargo movements can be considered basic regardless of whether the cargo originates inside or outside the study area. The allocation of income earned from inbound cargoes is more difficult, since these are not all destined for local consumption. Mini-bridge, land-bridge, and other cargoes whose destinations are outside the port study area produce basic impacts. Similarly, inbound cargoes which are intermediate inputs to products manufactured in the study area and then exported can also be considered to have basic impacts at the level of the port industry. However, income earned from cargoes consumed locally cannot be attributed to the basic sector.

RECOMMENDED ACTION:

Many smaller Pacific Coast ports are engaged primarily in the export of one or two major commodities. Any imports of cargoes for local consumption are negligible in comparison to export activity. Therefore, these users can reasonably treat all port industry income as basic.

For larger ports with substantial inbound traffic, the identification of non-basic income may be quite difficult. One possibility would be a review of cargo destinations to determine local consumption. Sources for this would include Customs records, knowledge of the local economy, or optional questions included in the port industry survey. If cargo movements can be divided into basic and non-basic activities, then assumptions can be made about the income associated with each.

Because it is likely to be very difficult to determine the non-basic share of port industry income with any degree of confidence, it is generally recommended that all port industry income be considered basic for the purposes of this analysis. In most cases, this will result in a moderate overstatement of impacts, somewhat offset by the conservative approach used in calculating the multiplier. For those few cases in which non-basic activity accounts for a significant share of port industry income, the most useful approach may be to incorporate optional questions about this activity into the survey instruments.

USE OF RESULTS:

The basic component of port activity income will be used to determine total port-related impacts in Step F:2.

CALCULATION OF SECONDARY IMPACTS

Step F:2

PURPOSE:

Determine total income supported by the port.

DATA REQUIREMENTS:

Results of Steps E:7 and F:1.

RECOMMENDED ACTION:

If all port industry income is to be considered basic, total port-related income is the product of direct income and the income multiplier. Secondary income is the difference between total income and direct income.

If port industry income has been divided into basic and non-basic components, total port-related income is the product of basic income and the income multiplier plus the non-basic component of direct income. Secondary income is the difference between total income and direct income.

As noted in Step D:6, direct income represents payroll plus benefits. Other labor and proprietors' income is not included.

USE OF RESULTS:

Direct, secondary, and total income impacts can be published in the economic impact report and used to calculate other impact measures through ratio analysis.

CALCULATION OF SECONDARY IMPACTS

Step F:3

PURPOSE:

Determine total sales supported by the port.

DATA REQUIREMENTS:

Results of Steps E:6 and E:8 (RIMS multipliers or input/output sales multipliers).

RECOMMENDED ACTION:

The products of direct final demand sales by industry (i.e., after adjusting for double counting by subtracting freight forwarders and transportation brokers sales) and the RIMS gross output multiplier for each industry are summed to determine total gross output (or sales) supported by the port. Secondary sales are the difference between total sales and direct sales. The total gross output multiplier for the port industry can be calculated by dividing total gross output by total direct sales. Canadian port regions for which there are input/output studies may be analyzed by the same procedure.

The RIMS multipliers are presented in the form of direct effect component, indirect effect component, and gross output multiplier for each industry. The direct effect component is not the same as the direct impact of the port industry. Rather, it represents what are known as direct requirements in input/output analysis -- the first round of purchases made to produce a given output. The gross output multiplier is expressed as 1 plus direct effects plus indirect effects, where 1 represents direct port industry sales, the direct effects component represents the first round of purchases, and the indirect effects component represents all remaining rounds of interindustry and consumer spending.

A less expensive, but much less useful approach to using the RIMS multipliers is to calculate impacts based on the aggregated multipliers for BEA economic areas. These are presented in "Industry-Specific Gross Output Multipliers for BEA Economic Areas" published by the U.S. Department of Commerce. (Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, No. 052-045-000-48-7, \$2.00.) Most BEA areas consist of several counties and at least one large city, so that these multipliers will overstate impacts at the single-county level. Moreover, because these multipliers were originally developed to analyze water projects, the 56 sectors included provide significant detail for agricultural production but highly aggregated data for other industries. Nevertheless, if a decision has been made not to

order county and industry-specific RIMS multipliers for the port, the published data can serve to check the reasonableness of the economic base multipliers. Briefly, since the size of the BEA economic area is likely to overstate the secondary impacts of the port industry, an economic base multiplier which exceeds the output multiplier derived from published BEA data should be treated with a large amount of skepticism.

USE OF RESULTS:

Direct, secondary, and total sales impacts can be published in the economic impact report and used to calculate other impact measures through ratio analysis.

CALCULATION OF SECONDARY IMPACTS

Step F:4

PURPOSE:

Develop an income/sales ratio to compare the results of the economic base and RIMS approaches.

DATA REQUIREMENTS:

Most recent County Business Patterns for the port's state.

DISCUSSION:

Obviously, the purpose of calculating port industry impacts by two different methods is to compare the results. Since each method is based on different assumptions and data and has different flaws, similar results would indicate a reasonable level of accuracy. However, since the economic base technique used yields total impacts in terms of income and the input/output (e.g., RIMS) technique yields total impacts in terms of gross output (sales), a common unit of measure is needed before the comparison can be made.

The means for making this comparison described below is a payroll/sales ratio which can be used to convert economic base income impacts to sales equivalents and input/output gross output impacts to income equivalents. (Note that because the income impacts are based on payroll plus fringe benefits, published data are used to estimate the wage and benefit components of total employee compensation.)

The methodology described below is a simplified one based on the limited published data, money, and time available to most users of this kit. Information to calculate payroll/sales ratios for individual counties is published in the censuses of business (construction industries, mineral industries, manufacturers, retail trade, wholesale trade, selected services, and transportation) conducted every five years. The collection of data from the seven different censuses for two or more years is a tedious and expensive task. The alternative methodology should be adequate for the needs of most ports. The approach to undertaking the county-specific analysis, if a user wishes to do so, should be apparent from the recommended action described below.

RECOMMENDED ACTION:

Exhibit F:4-1 shows payroll/sales ratios for broad industry groups for the three Pacific Coast states. Estimated ratios for industries not covered in the business censuses were developed from national data on

employee compensation and business receipts by industry. Ratios are based on 1972 data, the latest year for which business census information is available. The Vancouver, British Columbia ratios were taken from An Interindustry Study of the Metropolitan Vancouver Economy completed in 1972. Historically there has been very little change in these industry ratios over time.

Since total port industry income and output impacts are not disaggregated by industry, it is necessary to compute a single payroll/sales ratio. This is done by determining an average payroll/sales ratio weighted by port county employment in each industry group. (This average ratio is the sum of employment in each industry division times its payroll/sales ratio divided by total employment.) The result is the relationship between payroll and sales for the port county for the year for which the income and output data were developed. (An advantage of this approach is that it eliminates the need to adjust for inflation, assuming that wages and prices inflate at the same rate.)

In order to compare the results of the economic base and RIMS techniques, the relationship between payroll, as used in the payroll/sales ratio, and income, derived from the economic base multiplier, must be determined. Payroll (income) is defined in the surveys to include fringe benefits; payroll data used to calculate payroll/sales ratios do not. National data (published annually in the "Handbook of Labor Statistics, BLS) indicate that benefits currently account for about 20% of total employer compensation. Therefore, after adjusting total income impacts to exclude the fringe benefit component, the results of the two approaches can be compared by using the payroll/sales ratio.

Because many of the steps in this analysis are rather imprecise, a 10-15% difference between the results of the two approaches is an acceptable indication of accuracy. In this case, either the average or the lower of the two totals can be considered the final estimate of port-related impacts. If the results are significantly different and remain so after checking for possible arithmetic errors, the conservative approach dictates selecting the lower estimate of port industry impacts.

USE OF RESULTS:

The final estimates of income and output impacts can be published in the economic impact report and used to calculate other impact measures through ratio analysis.

EXHIBIT F:4-1

PAYROLL/SALES RATIOS FOR
MAJOR INDUSTRY DIVISIONS

	<u>California</u>	<u>Oregon</u>	<u>Washington</u>	<u>Vancouver British Columbia^b</u>
Agriculture, Forestry, and Fisheries ^a	.194	.194	.194	.132
Mining ^a	.171	.171	.171	
Construction ^a	.257	.257	.257	.524
Manufacturing				
SIC 20 Food and Kindred Products	.100	.122	.191	.200
21 Tobacco Manufacturers	--	--	--	
22 Textile Mill Products	.173	--	.338	.286
23 Apparel and Other Textile Products	.229	--	.236	
24 Lumber and Wood Products	.191	.182	.184	
25 Furniture and Fixtures	.262	.280	.248	.340
26 Paper and Allied Products	.159	.139	.158	
27 Printing and Publishing	.290	.294	.365	.325
28 Chemicals and Allied Products	.134	--	.194	.052
29 Petroleum and Coal Products	.032	--	.025	
30 Rubber and Plastic Products N.E.C.	.206	--	.203	
31 Leather and Leather Products	--	--	--	.286
32 Stone, Clay, and Glass Products	.222	.228	.234	
33 Primary Metal Industries	.204	--	.120	.344 ^c
34 Fabricated Metal Products	.237	.229	.235	.288
35 Machinery, except Electrical	.279	.268	.305	
36 Electrical Equipment and Supplies	.307	.226	.329	
37 Transportation Equipment	.254	--	.236	.344 ^c
38 Instruments and Related Products	.332	.302	.375	
39 Misc. Manufacturing Industries	.234	--	.355	
Transportation, Communications, Utilities ^a	.319	.319	.319	
Wholesale Trade	.056	.050	.061	.466 ^d
Retail Trade	.135	.129	.132	
Finance, Insurance, and Real Estate ^a	.135	.135	.135	.277
Services	.351	.315	.342	^e

^aU.S. average ratio for California, Oregon, and Washington.

^bDetermined from An Interindustry Study of the Metropolitan Vancouver Economy, 1972.

^cManufacturing, N.E.C.

^dTrade and transport ratio is .466, communications ratio is .409; utilities ratio is .162.

^eHealth and Welfare ratio is .565; education ratio is .547; business services ratio is .435; other services ratio is .456.

Arthur D Little Inc

CALCULATION OF SECONDARY IMPACTS

Step F:5

PURPOSE:

Update input/output (RIMS) multipliers based on income multipliers (optional).

DATA REQUIREMENTS:

Bureau of Economic Analysis county personnel income data for the RIMS base year, County Business Patterns for the RIMS base year for the port's state, the United States summary, and other states, as needed, or for Canadian ports, Employment, Earnings and Hours and local or regional input/output study for the port region being studied.

DISCUSSION:

A significant criticism of the RIMS multipliers is that they are based on 1967 data. (An updated version of RIMS, based on 1972 data, is expected to be available by the end of 1979.) Multipliers based on dated information may ignore substantial changes in the structure or size of a region's economy. In other words, the RIMS multipliers will tend to understate the impact of the port industry in a region whose economy has expanded and overstate the impacts in a region where economic activity has declined.

Conceptually, at least, the input-output Type II multiplier, which considers all of the rounds of spending and production created by a given direct activity, is the equivalent of the economic base multiplier. (In practice, there are data and definitional problems which preclude the calculation of identical results.) Therefore, it can be argued that changes in the I/O (RIMS) multiplier over time should parallel changes in the economic base income multiplier. By determining the change in the income multiplier from the I/O base year to the present (the most recent year for which data are available), the change in the I/O multipliers can be estimated.

RECOMMENDED ACTION:

The procedure for calculating the income multiplier is described in Steps E:1 through E:7. The steps should be repeated to determine the income multiplier for the RIMS base year (currently 1967). If only one of the techniques for calculating the employment multiplier (Steps E:2, E:3, and E:4) was used, it is necessary to use only one technique to determine the

base year multiplier. Because BEA county income data for years prior to 1970 are not published, the necessary 1967 information must be requested from the Regional Economic Measurement Division or obtained from one of the state agencies or universities to which local personal income estimates are sent (see Exhibit F:5-1). When RIMS multipliers based on the 1972 I/O table become available, income data can be obtained from BEA publications.

The base year and current income multipliers should be compared and the percent change computed. This percent change is then used to adjust each of the RIMS multipliers. For example, if the income multiplier was 2.1 in the base year and is currently 2.2, the RIMS multiplier for each industry should be increased by 5%. Total gross output impacts can then be calculated with these updated RIMS multipliers (see Step F:3).

The procedure is the same for Canadian ports that wish to update local or regional input/output studies. It is necessary that income information for the same region as that used for the I/O study be obtainable. It must also be in sufficient detail to construct an economic base multiplier.

USE OF RESULTS:

The gross output impacts calculated with updated RIMS multipliers can be compared to total income impacts (see Step F:4) to determine the final estimate of total impacts. Use of the updated RIMS multipliers may help to narrow the difference between the results of the economic base and I/O approaches.

STATE AGENCIES AND UNIVERSITIES RECEIVING BEA
LOCAL INCOME ESTIMATES

Alaska

Institute of Social, Economic and Government Research
University of Alaska
College, Alaska 99701

Department of Economic Development
Alaska Division of Economic Enterprise
Pouch EE
Juneau, Alaska 99801

Office of Policy Development and Planning
Office of the Governor
Juneau, Alaska 99801

California

Center for Business and Economic Research
California State University - Chico
Chico, California 95926

Department of Finance and Industry
School of Business
California State University - Fresno
Fresno, California 93710

Institute of Business and Economic Research
University of California - Berkeley
556 Barros Hall
Berkeley, California 94720

Department of Finance
State of California
Sacramento, California 95814

UCLA Business Forecasting Project
Graduate School of Management
University of California - Los Angeles
Los Angeles, California 90024

Hawaii

Department of Planning and Economic Development
Post Office Box 2359
Honolulu, Hawaii 96804

EXHIBIT F:5-1
(continued)

Oregon

Bureau of Business and Economic Research
University of Oregon
140 Commonwealth Hall
Eugene, Oregon 97403

State of Oregon
Department of Economic Development
317 S.W. Alder
Portland, Oregon 97201

Budget Division
Oregon Executive Department
240 Cottage Street, S.E.
Salem, Oregon 97310

Research and Statistics Employment Division
Oregon Department of Human Resources
402 Labor and Industries Building
Salem, Oregon 97310

Washington

Economic and Planning Division
Department of Commerce and Economic Development
General Administration Building
Olympia, Washington 98501

Graduate School of Business Administration and School
of Business Administration
Office of the Dean
University of Washington
Seattle, Washington 98195

Research and Information Division
Department of Revenue
Olympia, Washington 98504

Step F:6

PURPOSE

Collect data to develop impact measure ratios and calculate port-related impacts expressed in units of interest to the user.

DATA REQUIREMENTS:

State employment and payroll data for year described in the survey; U.S. Department of the Treasury, Internal Revenue Service, Statistics of Income, Individual Income Tax Returns and Business Income Tax Returns for most recent year; state and local tax data as needed. Canadian port users should obtain Revenue Canada's Taxation Statistics (No. RV44), Corporation Taxation Statistics (ISSN 0576-0119), and Corporation Financial Statistics (ISSN 0575-8262) from Statistics Canada.

DISCUSSION:

The procedures described in the preceding steps yield estimates of port industry impacts expressed in terms of income (payroll) and output (sales). However, these measures are often not the most useful to the port. Typically, a report directed to the general public will express impacts in terms of employment, which is the most widely understood measures. Port-related tax payments are also frequently reported to illustrate the benefits resulting from public investments in port facilities and services.

Ratio analysis is used to redefine impacts in terms of various units of measure. Simply, secondary data sources are used to determine the relationship between the available measure (the one in which impacts are currently expressed) and the desired measure, and this relationship is used to convert total impacts. For example, once the employment/payroll ratio is determined, total port-related employment can be readily calculated from total payroll impacts.

There are two principal problems associated with ratio analysis -- the variation in ratios associated with the level of data aggregation and the differences between average and marginal relationships. An example of the first problem is the use of average wages per employer to calculate total employment. A county might have an overall average wage of \$12,000 per employee, and this could be used to convert total payroll impacts to total employment impacts. However, construction workers might average \$20,000 per year and retail sales workers \$8,000. If the payroll impacts are created primarily in one of these sectors, total employment impacts would be quite different from the average. Using the overall average implicitly assumes that impact employment distribution among industries is the same as total employment distribution.

The difference between average and marginal relationships is of greatest importance when ratios are used to make forecasts. As noted in Step F:4, payroll/sales ratios tend not to change over time at the national level, but this is not necessarily so for individual businesses or even counties. For example, a retailer might be able to handle a 10-20% sales increase without additional employees and only then need to hire additional sales clerks. A much larger sales increase could take place before additional bookkeepers, buyers, or managers were needed. Alternatively, a relatively small increase in sales could give a business the "critical mass" it needs to hire new types of employees -- e.g., computer programmers, advertising specialists, etc., -- to replace outside services. These examples clearly indicate that ratios may change with changing conditions and should be used with care.

RECOMMENDED ACTION:

Impacts should be calculated in terms of employment and, if desired, income taxes generated. A user who wishes to express impacts in some other measure can create additional ratios following procedures analogous to those described below. However, it is important to recognize the limitations of this method and understand that each successive transformation of impact estimates is likely to decrease their accuracy.

Employment is calculated by determining average annual wages per employee for the study area and dividing this into total impact payroll to derive full-time equivalent employment. The best sources for payroll and employment data are the state agencies which collect them under various federal programs. In the three Pacific Coast states, plus Alaska and Hawaii, they are:

Employment Security Division
Department of Labor
Post Office Box 3-7000
Juneau, Alaska 99802

California Employment Development Department
Post Office Box 1679
Sacramento, California 95808

Department of Labor and Industrial Relations
Post Office box 3680
Honolulu, Hawaii 96811

Oregon Department of Human Resources
Employment Division
875 Union Street, N.E., Room 402
Salem, Oregon 97310

Washington Employment Security Department
1007 South Washington Street
Olympia, California 98501

In Canada all employment and payroll data are collected by Statistics Canada.

Annual data from the appropriate state agency should be used rather than County Business Patterns data because the latter represent employment for only a single week and may be distorted by seasonal variation in some industries. If employment and payroll information is not available for the year covered by the survey (that is, the year for which direct payroll impacts are reported), the Consumer Price Index is a readily available statistical source that can be used to adjust average payroll per employer for inflation. Statistics Canada's Employment, Earnings and Hours is published monthly. An annual average can be estimated from the monthly statistics.

Ratio analysis can also be used to determine federal, state, and local income taxes paid. Estimates of other state and local taxes (sales, property, etc.) should be limited to the direct impacts derived from the survey because of the difficulty of avoiding double counting secondary impacts.

Personal income taxes can be calculated by determining the effective tax rate on wages and salaries. U.S. Internal Revenue Service, Statistics of Income, Individual Income Tax Returns, published annually, shows total income tax paid as a percent of adjusted gross income, and this can be used to estimate individual income taxes paid to the Federal government. Similar information on state income taxes can be obtained from the appropriate state agency. Where state or local governments levy flat rate income taxes, the prevailing rate can simply be applied to payroll impacts. Revenue Canada's publication entitled Taxation Statistics provides similar information for Canadian users of this "kit".

Business income taxes must be calculated in two steps. First taxable income must be calculated, and then appropriate tax rates can be applied. U.S. Internal Revenue Service, Statistics of Income, Business Income Tax Returns, published annually, shows receipts and net income for major industry divisions for proprietorships, partnerships, and corporations. These data can be used to calculate net income as a percent of receipts for all businesses and for each industry division. Because estimates of sales are not disaggregated, the percent for all businesses must be used. (There are no readily available local data to derive a weighted income as a percent of sales figure.) Once net business income has been estimated, prevailing federal, state, and local tax rates can be used to estimate business income tax payments.

The Canadian publication Corporation Financial Statistics can be used in conjunction with Corporation Taxation Statistics to first estimate a sales-to-net-income ratio that would then be used with the data in Corporation Taxation Statistics to determine tax payments.

USE OF RESULTS:

These ratio analysis techniques can be used to convert port-related impact estimates to the form most useful for public reports.

PREPARATION AND DISSEMINATION OF REPORT

Step G:1

PURPOSE:

Prepare a report describing the results of the economic study conducted using this kit.

DATA REQUIREMENTS:

Results of all preceding steps.

DISCUSSION:

The type of report prepared depends primarily on the purpose of the study. If the port's main purpose is a public information effort highlighting the benefits of the port to the local economy, its report should be a short document summarizing the major findings of the study and aimed at a wide readership. An economic impact study done to support policy or investment decisions about which there is likely to be debate will require a much more detailed and comprehensive report. A report of this type would describe research methods, data sources, calculation procedures, and, in effect, each of the steps contained in this kit. The detailed report should also contain a short summary of findings similar to that described above for distribution to the general public. If the port decides to publish only a summary report, it is still necessary to have on file the type of information required for the detailed report (e.g., copies of raw data and calculations) to answer any questions about how the findings were obtained.

RECOMMENDED ACTION:

The port economic report should contain, at a minimum:

- A statement of the purpose of the study.
- Definitions of any terms used in the report, including a specific definition of the study area selected.
- A description of the methodologies used to estimate direct and secondary effects.
- Port industry direct and secondary impacts and port-dependent industry direct impacts expressed in terms of employment, income, output, taxes paid, or other relevant measures.
- A comparison of port industry impacts to total county or regional economic indicators.

The amount of material included will depend on the type of report. For example, a summary report might describe the methodology used with "A survey of firms in the port industry was used to estimate direct impacts. Secondary impacts were estimated by an economic base multiplier." A detailed report would probably include copies of the questionnaires used, the number of questionnaires mailed and the response rate, an indication of the coverage of the survey (e.g., firms employing 75% of all workers in the warehousing industry responded), calculations of secondary multipliers similar to Exhibits E:3-1 and E:4-1, and other information so that the reader can follow each step and duplicate them, if desired. However, survey data should not be presented in sufficient detail for individual firms' responses to be identified. When several firms in an industry respond, aggregated survey results for this industry can be presented. For industries in which there are only one or two firms or responses, data included in report tables should be grouped into an "other" category.

The format of the report and the method of data presentation will be selected by the project director. It is essential, however, that the published results do not imply more precision than is warranted by the methodology. Estimates of impacts will be reasonably accurate; they will not be precise. It is important for the user to acknowledge this uncertainty. Rather than reporting "the port industry supports 642 jobs in our community," the report should state, "it is estimated that the port industry supports approximately 650 jobs" or "the port industry supports some 600-700 jobs." Since the reporting of even rounded estimates may be interpreted as precise numbers, we recommend the use of graphics, particularly in widely distributed reports. A pie chart could be used to show port industry direct and secondary employment in relation to total study area employment. A bar chart could be used to show the change in port industry impacts from one study year to the next. Presentations of this type are often more effective than lists of numbers in conveying information to the public.

PREPARATION AND DISSEMINATION OF REPORT

Step G:2

PURPOSE:

Disseminate the port economic impact report to interested individuals and groups.

DATA REQUIREMENTS:

Reports prepared in Step G:1.

RECOMMENDED ACTION:

Copies of the economic impact report should be sent to local government officials, newspapers, public libraries, firms which participated in the survey, and any other interested parties. (A newspaper article might suggest that members of the public request copies from the port district.)

If only a summary report is prepared, it should be sent to the individuals and groups mentioned above along with the name of a person at the port (e.g., the study director) who can be contacted for additional information. If a detailed report is prepared, a complete copy should be sent to public libraries, newspapers, and government agencies. Participating firms and individuals should receive the summary section only. Those who request more information could then be sent the complete report.

LIST OF DATA REQUIREMENT PUBLICATIONS

UNITED STATES

Bureau of Economic Analysis, U.S. Department of Commerce, Regional Economic Measurement Division, County and Metropolitan Area Personal Income Data, available from National Technical Information Service, Springfield, VA 22161

Bureau of Economic Analysis, U.S. Department of Commerce, Regional Economic Measurement Division, County and Metropolitan Area Personnel Income Data for the RIMS Base Year, available from National Technical Information Service, Springfield, VA 22161

County Business Patterns, available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402

Dun and Bradstreet Directory, available through Dun and Bradstreet, Inc. 99 Church Street, Post Office Box 803, New York, NY 10008

Employment and Earnings, published by Bureau of Labor Statistics, U.S. Department of Labor, Washington, D.C.

"Industry-Specific Gross Output Multipliers for BEA Economic Areas", published by the U.S. Department of Commerce. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, #052-045-000-48-7, \$2.00.

Standard Industrial Classification Manual, published by the Office of Statistical Standards, Bureau of the Budget, Washington, D.C.

Coast Marine & Transportation Directory (1978) published by Pacific Shipper, Inc., 1050 Sansome Street, San Francisco, CA 94111, \$8.00.

CANADIAN

Corporation Taxation Statistics, ISSN 0576-0119, \$2.80.

Corporation Financial Statistics, ISSN 0575-8262, \$7.50.

Taxation Statistics, Revenue Canada RV44-78

Standard Industrial Classification Manual, Revised 1970, Statistics Canada, Publications Distribution, Ottawa, Canada K1A 0T6, Cat.#12-501E, \$6.00.

Employment, Earnings and Hours, Statistics Canada, Publications Distribution, Ottawa, Canada K1A 0T6, Cat.#72-002

Canadian Census Vol. III, Part 4, Industries by Sex for Census Metropolitan Areas, Place of Residence, and Place of Work (Bulletin 3.4-5), May 1975, \$1.05.

Canadian Census, Vol. III, Part 4, Industries by Sex, for Census Agglomerations of 25,000 and Over (Place of Residence) and Census, Agglomerations of 50,000 and Over (Place of Work) (Bulletin 3.4-5), May 1975, \$1.40.

Canadian Statistical Review, Cat. # 11-206.

Local or Regional Input/Output Studies - local universities, colleges and offices of the Ministry of Economic Development should be canvassed to determine the availability of input/output studies. For example, a study for the Vancouver area was conducted by H. Craig Davis of the University of British Columbia. It is entitled An Interindustry Study of the Metropolitan Vancouver Economy and is available from Mr. Davis at the School of Community and Regional Planning at U.B.C.

IV. GLOSSARY

BREAK-BULK CARGO - A catch-all category for cargoes not shipped as dry bulk, liquid bulk, in containers, or in unitized form. Most commonly it includes cargoes packed in cartons or bags that are loaded or unloaded by hand.

BULK CARGO - Unsegregated cargo, either in liquid or solid (dry) form, that is handled and loaded (or can be handled and loaded) in a continuous operation -- i.e., there are no discrete units to be loaded. The category includes: ores, petroleum products, metal scrap, wood chips, fertilizers, and other chemicals.

CONTAINER CARGO - Cargoes shipped inside of standardized metal boxes (most often 8'x 8'x20' or 8'x8'x40').

DIRECT IMPACT - The first round economic impact -- i.e., in the case of the port industry employment, income, sales, taxes, etc. associated with the operation of port industry firms (this involves the netting out of non-waterborne commerce related employment, income, etc., for some firms, e.g. banks). Direct impact is used synonymously with PRIMARY IMPACT.

ECONOMIC IMPACT - Changes in the level of economic activity attributable to a particular event or activity. It is generally measured in terms of employment, income, tax revenues, or sales. For example, the employment at a port's container freight station is, to a certain extent, tied to the availability of container handling equipment and facilities at the port. However, the economy of a region is comprised of firms that exhibit mutual dependence, therefore, it is inaccurate to state that the existence of one firm is entirely dependent upon another.

EMPLOYMENT IMPACT - The economic impact of a project or economic activity measured in terms of employment -- i.e., the number of jobs or full-time equivalent positions attributable to the project or activity.

GENERAL CARGO - Segregated cargo handled in containers or as break-bulk. This generic category also includes logs, lumber, pulp, motor vehicles, steel, and other metal alloy products.

INCOME IMPACT - The economic impact of a project or economic activity measured in terms of income. Income can be defined in various ways -- e.g., as gross pay (e.g., Statistics Canada - earnings) or as more comprehensive measures including proprietors income, government transfer payments, rental income, and/or dividend income (e.g., BEA - labor and proprietors' income).

INDIRECT IMPACT - Economic impact beyond the first round impact. For the purpose of this study this would include the employment and income generated in industries or firms supplying goods to the port industry firms; a component of SECONDARY IMPACT.

INDUCED IMPACT - Economic impact -- e.g., employment and income -- generated by the spending of employees in firms providing direct or indirect economic impacts; a component of SECONDARY IMPACT.

NEO-BULK CARGO - General cargo that moves in unitized form often on ships designed specifically to carry one type of cargo. The category includes autos, lumber, and steel products.

PORT-DEPENDENT INDUSTRY - The group of firms or activities that ship cargoes through a port(s). This includes any firms or industries that receive materials through a port or ship products through a port. If a firm runs its own terminal and employment of the terminal can be separated from total firm employment, the terminal activity can be considered part of the port industry rather than the port dependent industry.

PORT INDUSTRY - The group of firms or activities that are directly needed for the movement of waterborne cargo. It includes firms falling into the following Standard Industrial Classification (SIC) categories: SIC 44, Water Transportation (Canada SIC 504 and 505); SIC 42, Motor Freight Transportation and Warehousing (Canada SIC 507 and 527); SIC 47, Transportation Services (Canada SIC 504 and 505); SIC 6512, Operators of Nonresidential Buildings (i.e., lessors of piers, docks, and associated buildings and facilities). The 1972 Standard Industrial Classification Manual, published by The Executive Office of the President, Office of Management and Budget, can be used to obtain more detail about these categories.

(Note: The Canadian SIC is similar to the U.S. SIC, but the numbering is not consistent. See Standard Industrial Classification Manual, Revised 1970 from Statistics Canada to obtain details.)

PORT REGION - The geographical area to which port cargoes are sent and from which they are received; the service area(s) of the ports. This area varies for different commodities -- e.g., container cargo may be collected from or shipped over much greater distances than some bulk cargoes. For the purpose of this "kit", the port region is defined as a collection of counties (for U.S. ports) and census metropolitan areas (for Canadian ports). This definition facilitates the compilation of employment and income data for the port region.

PRIMARY IMPACT - See DIRECT IMPACT

RIMS - Regional Industrial Multiplier System - It is a technique for producing regional input/output tables from the national input/output table. The U.S. Department of Commerce, Bureau of Economic Analysis provides input/output sales multipliers for individual county economies or regional economies using RIMS.

SECONDARY IMPACT - The sum of indirect impacts and induced impacts.

SIC CODE - Standard Industrial Classification code; a classification system published by the Executive Office of the President, Office of Management and Budget, that relates specific economic activities to generalized industrial categories. The Canada S.I.C. is published by Statistics Canada.

TAX IMPACT - The economic impact of a project or economic relationship measured in terms of the specific tax revenues generated. The tax impact can be measured in terms of local tax revenues, state tax revenues, or federal tax revenues.

APPENDIX

CASE STUDIES

A. BACKGROUND

The purpose of this kit was the development of an economic assessment methodology which could be used by ports with limited staff and resources. In preparing the kit, an attempt was made to anticipate special circumstances or problems which might arise and suggest solutions or alternative approaches. However, no document of this type can deal with the full range of issues that individual port districts may encounter in conducting economic assessments. Four case studies were undertaken so that the procedures in this kit could be illustrated in the context of specific port impact studies. As noted, it is likely that an individual port will have unique conditions or problems not treated in the text of this kit. Therefore, this summary of the case studies focuses on the difficulties encountered in each case and the ways in which they were handled. In some instances modifications were made to specific steps in the kit to clarify instructions and avoid problems experienced by the test ports. Other problems were resolved by case-specific decisions which may provide some guidance for reasonable judgments by other users. Overall, we believe the case studies have been very important because they identified areas of the methodology which needed additional explanation or clarification.

1. Selection of the Test Ports

The goal of this kit was to provide a methodology which could be used by U.S. and Canadian ports of different sizes with different cargo mixes. Therefore, the test ports were selected to represent a cross-section of potential users. The three areas and four ports tested were:

- Grays Harbor, Washington -- The Port of Grays Harbor is the smallest of the four test ports. It is primarily a center for the export of logs, lumber, and pulp. It can be considered representative of many Northwest ports which service the area's forest products industry.
- San Francisco-Oakland, California -- The San Francisco Bay Area contains two major ports, both of which handle a wide variety of commodities. The ports serve a metropolitan area of several million inhabitants and a highly developed economy. The Port of Oakland currently accounts for about 70% of the tonnage shipped through the two ports due to its function as a containerized cargo "load center." These test ports were selected to illustrate the analysis of a region with more than one port.

- Vancouver, British Columbia -- The Port of Vancouver is the largest port in British Columbia and, in terms of tonnage, the largest port on the West Coast of North America. The major commodities shipped through Vancouver are coal, grains, oil and other bulk items. The Port of Vancouver was selected to illustrate the application of the methodology to Canadian ports.

2. Role of Port Staff

As discussed in Chapter 1, the development of reliable survey data is the single most important element of the economic impact study. Moreover, conducting a successful survey is typically the most difficult element of the assessment methodology. Therefore, the survey work for the case studies was conducted by the staff of the test ports in accordance with the procedures being developed for the kit. This served both to test the prescribed methodology and to identify difficulties which might arise in different situations. Secondary impact calculations were performed by Arthur D. Little, Inc., because of both the limited time available for this work and the in-house availability of most of the required secondary data.

B. GENERAL PROBLEMS AND SOLUTIONS

1. Survey

The test ports' difficulties in conducting the survey fell into two categories -- determining which firms should be included in the survey and obtaining an adequate number of responses to the questionnaire.

a. Firms Included in the Survey

Each port surveyed some firms which could not be included in the "port industry." To some extent this is a result of the lack of a commonly accepted precise definition of the industry. For the purposes of this economic assessment, the port industry has been defined as the group of firms or activities that are directly needed for the movement of waterborne commerce. The firms which produce or consume the commodities shipped through the port make up the "port-dependent industry." A port also does business with and may even lease property to numerous other firms which fit neither of these definitions.

The survey work done by the test ports suggests that the majority of port industry activities fall into two major industrial classifications:

- Water Transportation. This group includes vessel operators, tug and towing services, stevedores and other cargo handling, marine terminal operation, pilots, etc. (U.S. SIC 44, Canadian SIC 504 and 505)

- Transportation Services. This group includes freight forwarders and firms involved in the arrangement of transportation, such as custom house brokers, shipping agents, and export/import firms. (U.S. SIC 47, Canadian SIC 504 and 505)

The other SICs involved in the transportation of waterborne commerce include 40 and 42 -- railroad transportation and motor freight transportation and warehousing (Canadian SIC 506 and 507). Additional firms typically included in the port industry are in SIC 373, Ship and Boat Building and Repairing (Canadian SIC 327), and SIC 559, which includes retailers of marine supplies (ship chandlers).

Firms identified and surveyed by the test ports but not part of the port industry include manufacturing, financial, and service activities. The forest products firms in Grays Harbor County can be primarily classified as part of the port-dependent industry. San Francisco Bay region manufacturers of paint and valves used in shipbuilding do not belong to either the port industry or the port-dependent industry. These firms are not related to the area's ports except insofar as some of their economic activity will be represented in the indirect multiplier of the shipbuilding firms. Similarly, the effects of firms which supply business and financial services to port industry clients -- insurance brokers, banks, attorneys, etc. -- will be reflected in the port industry multiplier and should thus not be considered direct activity.

A more rigorous definition of the port industry (i.e., by SIC code) will help to direct the survey to appropriate firms. Some of the respondents to the test ports' questionnaires appeared to misinterpret the question "describe your waterborne commerce-related operations." One firm described its activities as exporting machinery but closer examination of its responses to other questions indicated that the firm was actually engaged in manufacturing machinery some of which was exported. Therefore, the survey form should ask for the respondent's SIC code, if known, in addition to a description of the firm's activities. This will permit allocation of the respondents to the proper categories and serve as an additional check on the groupings used in the master list.

b. Response Rate

The response rates for the test ports' surveys (percent of total questionnaires returned) averaged about 20%. However, the quality of the responses was far from uniform. Some firms returned survey forms with some or even all of the requested data missing. The response rate was also significantly higher or lower than the overall average for some industries. For example, all but one of the firms in one industry might answer the port's questionnaire, but there might be no responses from firms in another industry. All of the test ports had a significant number of firms that were unwilling to disclose any financial data (sales, payrolls, etc.).

The most cost-efficient and effective way to increase the response rate appears to be telephone interviewing. Depending on the needs of the port conducting the study, a short format telephone interview can be used to collect essential data -- employment, revenues (sales), and payroll. This information is the minimum required to calculate direct and secondary economic impacts.

A possible option for ports that meet resistance from firms unwilling to disclose information is to use a "multiple choice" response format. Based on some preliminary knowledge about the firms that are potential respondents, ranges for key data items can be developed -- e.g., employment: 0-9, 10-19, 20-39, 40-59, etc. Firms which will not provide specific data may be willing to indicate the appropriate range. The midpoint of the selected range can then be considered the response for purposes of coding and tabulating.

2. Determination of Direct Impacts

The calculation of direct impacts in the case studies essentially followed the procedures outlined in element D of the methodology, but the quantity and quality of the survey data required some modification of the suggested steps.

Step D:5 recommends partitioning the surveyed firms by employment size classification for purposes of tabulating responses. However, the number of responses received by the test ports was too small for such a tabulation to be useful. Case study survey data were thus tabulated by industry, but all employment size classifications were grouped together.

Some of the test ports received no responses from firms in a particular industry. If this information is omitted for a segment of the port industry, both direct and secondary impacts will be understated. Therefore, sales and payroll were estimated for these industries when only employment data were available. First, payroll per employee for the appropriate year was derived from the sources cited in Step F:6 and used to calculate total payroll. Then, the payroll/sales ratios cited in Step F:4 were used to determine total sales. While this is admittedly somewhat circular and less accurate than a survey-based approach, it is a means to complete the economic assessment when other methods are not available.

The tabulation of direct sales (revenue) information was adjusted to prevent double counting by omitting the reported sales of freight forwarders, transportation brokers, and related businesses. These firms typically report sales figures which include the cost of transportation they have arranged; however, the shipping firms, stevedores, etc. report the same sales. Therefore, the true sales figures for transportation service firms should be equivalent to the value added (payrolls and profits) by these businesses and exclude amounts paid to other port industry firms. Because there is no available information from which to determine the value added portion of transportation service revenues, and because this number is small relative to total revenues, a decision was made to eliminate these firms from the calculation of sales impacts. However, payroll and employment for these firms were considered since these impacts are not duplicated in other responses.

3. Calculation of Secondary Impacts

Secondary impacts for the test ports were calculated in accordance with the steps outlined in the kit. There were no significant problems encountered which had not been anticipated in the development of the methodology, but time constraints limited the analysis to estimation of sales, income, and employment impacts.

C. SPECIFIC CASE STUDIES

1. Grays Harbor, Washington

The Port of Grays Harbor identified some 72 port industry and port-dependent firms to be included in the survey. Responses were received from 19 firms, including:

- One vessel repair firm (SIC 37)
- Two trucking firms (SIC 42)
- Four water transportation firms, including the port itself (SIC 44)
- Seven transportation services firms (SIC 47)
- Five forest products firms (port-dependent)

Five of the transportation services firms were Seattle-based shipping/trading companies which reported no employment and payroll in Grays Harbor. Therefore, 14 of the responses received were usable, for an overall response rate of about 20%.

The Port of Grays Harbor provided additional information on direct employment to supplement the survey data. Specifically, the port estimated the number of employees of a major forest products firm directly engaged in waterborne commerce. While these firms would be considered port-dependent, it is reasonable to separate out those employees engaged in waterborne commerce and their prorated shares of sales and payrolls and assign them to the port industry.

Table 1 shows the estimates of direct port and port-dependent activity. SIC 44 includes the forest product firm activity described above and the operation of the port itself. Data for firms which did not respond were estimated in accordance with the procedures outlined in element D of the methodology. Almost all of the firms identified in SIC 47, transportation services, are located in Seattle. Because only two of the seven firms in this group which responded to the survey reported employment and payroll in Grays Harbor, no activity was assigned to the firms which did not respond. This may undercount impacts in this industry to some extent, but when available data are insufficient to make reasonable estimates, a conservative approach is preferred. Employment and payroll estimates thus represent only the amounts reported by two survey respondents. Sales were not estimated because of the decision to omit this figure to avoid double counting.

Direct port-dependent activity represents the responses of five forest products firms (less activity allocated to the port industry) and estimates for two additional firms identified by the port. Because the Grays Harbor survey instrument did not include questions about alternate ports or the amount of the firm's business that would be lost without the port, it was not possible to ascertain the extent to which these firms are truly port-dependent.

Table 2 shows the calculation of total economic activity associated with the Port of Grays Harbor. Using the economic base income multiplier, whose development is illustrated in Steps E:3 through E:7, total payroll supported by the port is estimated to be about \$20 million. Port-dependent activities contribute almost \$75 million.

The RIMS approach yields a total impact estimate of almost \$85 million in sales. Using a weighted payroll/sales ratio developed from Grays Harbor County employment data and the industry-specific ratios in Step F:4, the sales equivalent of the income impact calculated using the economic base multiplier is \$78 million, only 7% less than the RIMS-derived value.

Employment impacts were estimated from the lower value (the economic base technique). Total wages are divided by the 1978 average wage per employee for Grays Harbor County to yield a total employment impact of 1280. Since direct employment for the port industry is estimated at about 685, the implied employment multiplier is 1.87, which is within the range one would expect for an economy the size of Grays Harbor County.

The 1300 port industry direct and secondary employees account for about 6% of Grays Harbor County's total employment of 22,000. When the 3200 port-dependent workers are considered as well, waterborne commerce-related activities account for some 20% of the county's total employment.

2. San Francisco and Oakland, California

The Port of San Francisco and the Port of Oakland jointly conducted a survey to determine their impact on the San Francisco Bay region. Questionnaires were sent to port industry firms and to firms that use the ports in the movement of their goods or materials. We have calculated only the port industry impact due to difficulties in the determination of the port-dependent industry universe.

Forty-one usable responses were received to the 140 questionnaires sent to firms defined as being in the port industry. This corresponds to a 29% response rate. The number of responses in specific industrial categories, along with tabulations of employment, payroll, and sales associated with each category, is provided in Table 3. Responses were received from:

TABLE 1

PORT OF GRAYS HARBOR DIRECT ACTIVITY

	<u>Respondents</u>	<u>Universe</u>	<u>Employment</u>	<u>Payroll</u> (\$000s)	<u>Sales</u> (\$000s)
Port Industry					
SIC 37	1	1	275	\$ 6,100	\$ 15,700
SIC 42	2	2	27	546	1,216
SIC 44	4	11	372	6,760	26,996
SIC 47	<u>2</u>	<u>N.A.</u>	<u>10</u>	<u>212</u>	<u>N.A.</u>
Total	9	--	684	\$13,618	\$ 43,912
Port-dependent Industry	5	7	3,195	\$73,775	\$334,640

TABLE 2

PORT OF GRAYS HARBOR TOTAL ECONOMIC ACTIVITY
(dollars in thousands)

1. Economic Base Multiplier

Direct Income	\$13,618
X Income Multiplier	1.45
= Total Income	\$19,746

2. RIMS Multiplier

Direct Sales by Industry
X RIMS Multipliers

SIC 37	\$15,700	X	2.021	=	\$31,730
SIC 42	1,216	X	2.228	=	2,709
SIC 44	26,996	X	1.831	=	<u>49,430</u>

Total Sales \$83,869

3. Comparison

Total Income	\$19,746
X 0.8 (wage percent of payroll and benefits)	\$15,797
÷ Payroll/Sales Ratio for County	0.203
= Total Sales	\$77,818

4. Total Employment

Total Wages	\$15,797
÷ Average Wage per Employee	\$12.339
= Total Employment	1,280

- Five boatbuilding (SIC 3731) and shipbuilding (SIC 3732) firms
- Eight trucking firms (SIC 42)
- Sixteen water transportation firms (SIC 44), including the ports themselves
- Seven firms providing transportation services (SIC 47)
- Five chandlers (SIC 55)

A number of difficulties were encountered during the survey stage of the analysis for these ports. The primary problem was the low response rate. Call-back reminders did little to improve the response rate, but it was found that telephone requests for a limited number of question responses increased the information available for analysis dramatically and at a relatively small cost. The Port of Oakland was able to assign a summer university intern to the task of following up after non-respondents. He was instructed to contact a member (or members) of non-responding firms that could provide answers to the following five questions:

1. What are the firm's waterborne commerce related activities?
2. What are last year's total sales or revenues related waterborne commerce?
3. What are the total number of full-time equivalent employees engaged in waterborne commerce related activities?
4. What is the total payroll of these employees?
5. What percentage of your business is related to the Port of Oakland and to the Port of San Francisco?

These abbreviated telephone interviews were very successful. Their only drawback is the limited quantity of information obtained which in turn limits the variety of impact measures that can be calculated as well as the "checks" that can be performed on the survey data.

A second difficulty encountered during the survey stage was the Port of Oakland's reluctance to have the completed surveys mailed to the Port, since doing so would have placed the surveys in the public domain. This problem was handled by having the surveys sent to Arthur D. Little, Inc. An alternate approach would be to have them returned to a private firm associated with the Port -- e.g., its counsel. It is not known whether having the completed questionnaires sent to a private firm affected the response rate.

The estimates of total direct sales, employment, and payroll presented in Table 3 were derived with the procedures outlined in element D of the methodology. The totals are for the Port of San Francisco and the Port of Oakland combined. When the San Francisco-Oakland survey work was begun, the intention was to partition the direct activity between the two ports. However, the data provided in the responses proved inadequate to make this allocation. There was significant variation in the allocation between ports reported by survey respondents (e.g., some firms reported 100% of their business in one port, some reported 100% split between the two, and some reported only 10-20% for both). Because responses were received from only about one-third of the port industry firms (and much fewer in some SICs), it was decided that any attempt to allocate activity between the ports would be highly suspect. However, a direct impact split could be estimated by assuming it was equivalent to the cargo split.

Table 4 provides a summary of the secondary impact calculations performed for the Port of San Francisco and the Port of Oakland. First total income is determined using the economic base approach described in element E of the methodology. In part 3 of Table 4 the \$458 million in total income is converted to an estimate of the total sales associated with it. The \$1,580 million sales estimate allows a direct comparison with the RIMS derived total sales impact of \$1,250 million. The discrepancy between the figures is due primarily to the use of a regional average payroll/sales ratio. The large retail and FIRE (finance, insurance, and real estate) sectors in the region bias the ratio downward from what it should be in this application. The use of a payroll/sales ratio that is a weighted average of a waterborne commerce related payroll/sales ratio and an average regional payroll/sales ratio would be preferred.

In keeping with our conservative bias total employment was calculated by applying the payroll/sales ratio to the RIMS derived total sales, rather than the economic base derived total sales. Using the economic base derived total sales yields an estimated total employment impact of 25,443, some 26% higher than the RIMS derived total of 20,133. These employment impacts represent 1.7% and 1.3% of total regional employment. The implied employment multipliers are 2.32 (RIMS sales impact) and 2.93 (economic base sale impact).

No attempt has been made to distribute these impacts geographically within the Bay Area. The direct impact "split" between the Port of Oakland and the Port of San Francisco could be used to crudely approximate the impact of each port on the San Francisco Bay region, defined for the purpose of this study to consist of Alameda, Contra Costa, Marin, San Francisco, San Mateo, and Santa Clara counties. Generally it is not recommended that aggregate cargo tonnage or value be used to define the "split" since impacts vary by cargo type and destination; these factors differ greatly among ports.

3. Vancouver, British Columbia

The Port of Vancouver, British Columbia, was included in the study in an attempt to broaden the kit's use to Canadian ports. This entailed only minor modifications of the direct impact determination portions of the methodology (sections B, C, and D), but substantially altered the applicability of the secondary impact determination sections. Statistical data are collected differently in Canada than in the United States. The following discrepancies are the most important:

TABLE 3

PORTS OF SAN FRANCISCO AND OAKLAND DIRECT ACTIVITY

	<u>Respondents</u>	<u>Universe</u>	<u>Employment</u>	<u>Payroll</u> (\$000s)	<u>Sales</u> (\$000s)
Port Industry					
SIC 3731	4	7	2,094	\$ 53,115	\$ 99,145
SIC 3732	1	1	90	2,529	6,400
SIC 42	8	21	1,291	27,515	55,640
SIC 44	16	37	3,588	79,880	206,151
SIC 47	7	61	1,394	27,482	--
SIC 55	<u>5</u>	<u>13</u>	<u>238</u>	<u>4,284</u>	<u>30,256</u>
Total	41	140	8,695	\$194,805	\$397,592

TABLE 4

PORTS OF SAN FRANCISCO AND OAKLAND TOTAL ECONOMIC ACTIVITY
(dollars in thousands)

1. Economic Base Multiplier

Direct Income	\$194,805
X Income Multiplier	2.35
= Total Income	\$457,792

2. RIMS Multiplier

Direct Sales by Industry
X RIMS Multipliers

SIC 3731	\$ 99,145	X	3.615	=	\$ 358,409
SIC 3732	6,400	X	3.204	=	20,506
SIC 42	55,640	X	3.504	=	194,963
SIC 44	206,151	X	2.786	=	574,337
SIC 55	30,256	X	3.352	=	<u>101,418</u>

Total Sales \$1,249,633

3. Comparison

Total Income	\$ 457,792
X 0.8 (wage percent of payroll and benefits)	\$ 366,234
÷ Payroll/Sales Ratio for Region	0.232
= Total Sales	\$1,578,593

4. Total Employment

Total Wages*	\$ 289,915
÷ Average Wage per Employee	\$ 14.400
= Total Employment	20,133

*Determined by applying payroll/sales ratio to RIMS derived total sales.

- There is no service that provides RIMS type multipliers for small areas. However, it should be noted that Canada does have more current national input/output studies than does the United States, and that it has a sophisticated model that regionalizes (provincializes) its national I/O tables.
- Annual Canadian employment and payroll data are presented in much more aggregated form for small areas than in the United States. This increases the confidence the analyst has in the accuracy of the data, but does limit the use of the economic base methodology to census years.

We have constructed an economic base multiplier for Vancouver using 1971 Canadian Census data and have used a 1972 regional input/output study of the region to estimate secondary impacts of waterborne commerce related activity in the Vancouver area. For a more current analysis, the only alternatives for Canadian ports would be to conduct a regional input/output study or to regionalize an input/output study for a larger area of which they are a part -- i.e., the national I/O tables or provincial I/O tables. It is believed that most ports would not want to commit the resources necessary for such endeavors, especially given the relatively limited changes that would occur in the impacts determined by the procedures we have outlined.

The survey of port industry firms was very successful except for a few industry categories for which there were no responses. These included ships chandlers, trucking firms, marine pilots, and ship brokers. The overall response rate of 25% was especially good considering that a local trade publication printed a notice that suggested firms not respond to the questionnaire sent by the Port since the data they would provide were sensitive. Based on this experience it is suggested that port personnel contact local trade journals, associations, and newspapers to solicit the assistance, or at least the blessing, of this influential group.

The Port of Vancouver received questionnaires from 53 port industry firms and 16 port-dependent industry firms. Responses were received from the following types of firms:

- Customs brokers, 3 responses
- Shipping agents, 8 responses
- Freight forwarders, 4 responses
- Stevedoring companies, 4 responses
- Marine terminal operators, 5 responses
- Railroads, 3 responses
- Marine towing and tug lines, 6 responses
- Boat builders, 5 responses

- Grain elevator companies, 3 responses
- Marinas, 6 responses
- Marine service firms, 3 responses

Table 5 shows the aggregated employment, payroll, and sales associated with the port industry firms. The survey results were expanded for the more detailed groups listed above; then the two aggregations, "Trade and Transportation" and "Shipbuilding", were formed so as to match the input/output categories in An Interindustry Study of the Metropolitan Vancouver Economy.

Port-dependent industry impacts were not calculated because of time and budget constraints. For accuracy in the determination of port-dependent industry impacts it is very important that employment, sales, and payroll shares attributable to the existence of the port be identified. This demands careful checking by the analyst and recontacts to fill in missing responses. Because we could not do this, no port-dependent industry impacts were estimated.

Table 6 shows the calculation of total impacts from direct activity using an economic base employment multiplier and industry specific input/output multipliers from the aforementioned regional input/output study done for Vancouver. A recalculation of 1978 employment shares for the major industrial groupings in Vancouver showed remarkable consistency with the 1971 shares; therefore, the interindustry relationships have remained relatively constant during the intervening seven years. For this reason, and because the intervening time period is so brief, it is believed that the 1972 input/output study is still very useful. It is necessary to adjust some of the multipliers to account for inflation, however.

The economic base multiplier is based on 1971 Census data, since more recent data did not provide the necessary detail. The census survey is much more comprehensive than the monthly survey designed to provide the base information for Employment, Earnings, and Hours; hence, less aggregation of results is required. Total employment is estimated to be approximately 38,000 with this technique.

The economic base derived employment estimate should be compared with total employment estimated with the I/O multipliers. Employment was estimated by first calculating indirect wages from indirect sales. Then employment was estimated through division of wages by average wage. The resulting indirect employment was added to direct employment derived from the survey to obtain total employment. Total employment was estimated at approximately 30,000 using this input/output approach. Input/output derived employment is 79% of economic base employment.

Total wages were estimated using the economic base employment estimates and input/output derived sales estimates. The July 1978 average wage was multiplied by indirect employment (calculated with economic base multiplier) and added to the direct wage (compiled from the survey) to determine total wages of \$710,404,000. Input/output derived indirect sales of \$710,404,000 estimates were converted to wages through multiplication by a payroll/sales ratio, yielding \$589,637,000.

TABLE 5

PORT OF VANCOUVER, BRITISH COLUMBIA DIRECT ACTIVITY

	<u>Respondents</u>	<u>Universe</u>	<u>Employment</u>	<u>Payroll</u> (\$000s)	<u>Sales</u> (\$000s)
Port Industry					
Trade and Transportation	49	205	15,451	\$354,205	\$747,721
Shipbuilding	<u>5</u>	<u>8</u>	<u>1,251</u>	<u>31,773</u>	<u>74,988</u>
Total	53	212	16,702	\$385,978	\$822,709

TABLE 6

PORT OF VANCOUVER, BRITISH COLUMBIA TOTAL ECONOMIC ACTIVITY
(dollars in thousands)

1. Economic Base Multiplier

<u>Employment</u>	
Direct Employment	16,702
X Employment Multiplier	2.28
= Total Employment	38,081
<u>Wages</u>	
Indirect Employment	21,379
X Average Wage	15.175
Indirect Wages	324,426
+ Direct Wages	<u>385,978</u>
= Total Wages	710,404

2. I/O Multiplier

<u>Sales</u>	
Direct Sales by Industry	
X Sales Multipliers	
Trade and Transportation	\$747,721 X 1.69 = \$1,263,648
Shipbuilding	74,988 X 1.50 = <u>112,482</u>
Total Sales	\$1,376,130
<u>Wages</u>	
Indirect Sales	\$ 553,421
x Wage/Sales Ratio	.368
= Indirect Wages	\$ 203,659
+ Direct Wages	<u>385,978</u>
= Total Wages	\$ 589,637
<u>Employment</u>	
Indirect Wages	\$ 203,659
Average Wage	15.275
= Indirect Employment	13,333
+ Direct Employment	<u>16,702</u>
= Total Employment	30,035

PENN STATE UNIVERSITY LIBRARIES



A000071264981